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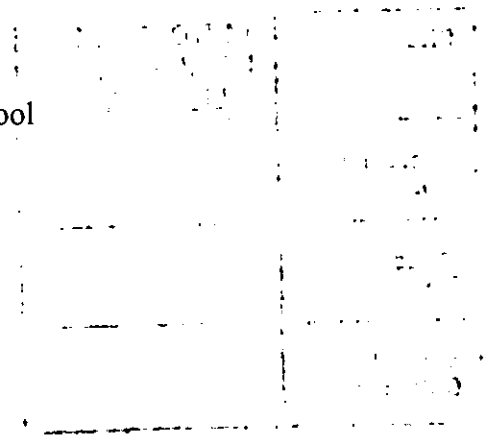
Financing High-tech SMEs in China

Li Xiao

A thesis submitted in partial fulfilment of the Middlesex University for the degree of
Doctor of Philosophy

The Middlesex University Business School

June 2007



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Abstract

This thesis addresses a gap in the literature relating to the financing of technology-based SMEs in China, more specifically, it examines the sources and types of finance sought and used by high-tech SMEs in relation to the various stages of their development since China's 'reform and opening' in 1978. The central argument is that the development of high-tech SMEs in China has been strongly influenced by the availability of different sources of funding and the relationship between private enterprises and the banking sector in particular. The thesis analyses the financing of high-tech SMEs in relation to a three stage model of business development. It also draws upon concepts from institutional economics to interpret the changing relationships between high-tech SMEs and financial suppliers. The empirical evidence is based on the achieved 83 face to face interviews including 74 with owners/senior managers of high-tech SMEs and 9 with bank and government officials in the study region namely Guangdong and Guangxi. The results show that the ease of access to finance significantly varied through the three development stages. Internal finance and funds from individuals and private firms remained the key sources for high-tech SMEs at all three stages, with bank finance and venture capital yet to become significant sources at the start-up and early stages. A clear financial gap for medium and long-term funds was identified, placing a serious barrier on the ability of high-tech SMEs to invest in the R&D necessary for making radical and distinctive innovations at the start-up stage. Currently, the majority of Chinese high-tech SMEs are dependent on the application of existing advanced technology to products and services and rely on their low costs of production to compete with other high-tech companies.

Contents

LIST OF TABLES	1
LIST OF FIGURES.....	1
CHAPTER 1: INTRODUCTION.....	1
1.1 Rationale for the study	1
1.2 Theoretical background	4
1.3 Research aims and objectives.....	6
1.4 The structure of the thesis.....	9
CHAPTER 2: FINANCING HIGH-TECH SMES IN THE	11
WESTERN CONTEXT	11
2.1 Introduction.....	11
2.2 Distinctiveness of high-tech SMEs	12
2.3 Financial constraints on growth and development of high-tech enterprises.....	16
2.4 Sources of finance	22
2.5 The links between financial demand and supply.....	28
2.6 The role of the public sector	30
2.7 Conclusion	33
CHAPTER 3: PRIVATE SECTOR /HIGH-TECH SMES AND FINANCE IN CHINA	35
3.1 Introduction.....	35
3.2 Distinctive characteristics of private SMEs	36
3.3 Distinctive characteristic of high-tech SMEs.....	44

3.4 Financial needs of high-tech SMEs.....	47
3.5 Financial sources available.....	50
3.6 Public funds.....	54
3.7 Conclusion	55
CHAPTER 4: CONCEPTUAL FRAMEWORK	57
4.1 Introduction.....	57
4.2 The main features of institutional economics	58
4.3 The institutional environment.....	60
4.4 Conceptual framework.....	67
4.5 The conceptual device of development stages.....	72
4.6 Conclusion	75
CHAPTER 5: RESEARCH METHODOLOGY.....	77
5.1 Introduction.....	77
5.2 Statement of research questions	77
5.3 Consideration of methodological choices	78
5.4 Research design	80
5.5 Survey process.....	92
5.6 Assessing validity of findings	97
5.7 Conclusion	100
CHAPTER 6: STAGE, AGE, SIZE, MANAGEMENT_CHARACTERISTICS, AND GROWTH	102
6.1 Introduction.....	102
6.2 Stage, age, size, and location	103
6.3 Management characteristics	113
6.4 Performance and Growth.....	122
6.5 Conclusion	129
CHAPTER 7: FINANCING AND THE ALTERNATIVE METHODS	131
7.1 Introduction.....	131
7.2 Access finance.....	132

7.3 The trend to access external finance with maturity	152
7.4 The alternative methods used	154
7.5 The importance of the informal relationship.....	160
7.6 Conclusion	163
CHAPTER 8 THE ROLE OF INSTITUTIONS IN FINANCE	165
8.1 Introduction.....	165
8.2 The deficiencies between high-tech SMEs and the banks.....	167
8.3 The relationship between high-tech SMEs and informal suppliers	179
8.4 The relationship of high-tech SMEs and government	182
8.5 Conclusion	185
CHAPTER 9 CONCLUSIONS AND IMPLICATIONS	187
9.1 Summarising the main findings	187
9.2 Policy implications	194
9.3 Future research directions	199
APPENDIX 1— THE QUESTIONNAIRE IN ENGLISH VERSION	202
APPENDIX 2— THE QUESTIONNAIRE IN CHINESE VERSION	214
APPENDIX 3—THE LIST OF QUESTIONS.....	225
APPENDIX 4—THE LIST OF QUESTIONS.....	227
BIBLIOGRAPHY	229

List of Tables

Table 2.1 The level of financial constraints and influential elements.....	19
Table 2.2 Main influencing elements in capital structure.....	29
Table 3.1 Last occupation prior to the private owners.....	40
Table 3.2 The Shares (%) of Financial Sources Used by Private Enterprises.....	42
Table 4.1 The contractual arrangements adopted by the banks according to three phases.....	70
Table 5.1 Economic structure by province in 2001, 2002, and 2003.....	83
Table 5.2 Main economic indicators by province in 2001, 2002, and 2003 (RMB Yuan).....	84
Table 5.3 Annual growth of output of high-tech sectors in China (1996—2002) (RMB 100 million Yuan).....	89
Table 5.4 Number of face to face interviews in two phases of the survey.....	89
Table 6.1 The sample stratification.....	103
Table 6.2 Duration in start-up and early stage by province and location (month).....	105
Table 6.3 The distribution of firms by date of formation in province and sector.....	105
Table 6.4 The average size of firms by province and sector.....	109
Table 6.5 The Distribution of firms by size group, by province and by sector.....	109
Table 6.6 The main reasons for the location by Park and Province.....	112
Table 6.7 The distribution of firms according to type of business foundation and by province and sector.....	112
Table 6.8 The distribution of age and gender by province and sector.....	116
Table 6.9 The distribution by the highest qualification of owners and province.....	116
Table 6.10 The distribution by previous working experiences of owners and province.....	117
Table 6.11 The distribution by ownership and province.....	120
Table 6.12 The percentage employees with academic degree by province.....	121
Table 6.13 The growth of sales turnover by province, sector, stage, and size.....	124
Table 6.14 Employment growth by province and stage of development.....	125
Table 6.15 The profitability in 2002-2003/2003-2004 by province and stage.....	126
Table 6.16 Distribution of businesses by export and province.....	127
Table 7.2 The sources of finance actually used at the start up by province (EIT firms only).....	136
Table 7.3 Structure of initial capital by province and sector (%).....	140
Table 7.4 Financial sources actually used at the early stage by province and sector.....	145
Table 7.5 The purposes of raising external funds by province at the early stage.....	145
Table 7.6 Financial sources actually used at the later stage by province and sector.....	149
Table 7.10 The alternative methods used by stage and province.....	158
Table 7.11 The alternative methods used by business activities at the early and the later stages...	159

Table 8.1 The success rate for loan applications by stage and province 168
Table 8.2 The main reasons for not using bank loans by stages of development 172
Table 8.3 The collateral provided for obtaining a bank loan by stages of development..... 172

List of Figures

Figure 4.1 The theoretical framework72
Figure 8.1 The role of institutions in finance166

Chapter 1: Introduction

1.1 Rationale for the study

China's economy has been transforming from a centrally planned to a market-based system and has been developing rapidly over the past three decades. China's GDP growth increased on average 9.3% per annum from 1978 to 1993, and 9.0% per annum between 1993 and 2004. The employment growth has averaged 2.5% per annum from 1978 to 1993, 1.1% between 1993 and 2004 (the World Bank, 2005). The impressive growth of the Chinese economy has largely come about from the private sector in the form of small and medium size of enterprises, which is one of the important outcomes of the reforms. The private sector has moved out of the shadows, and is playing a prominent role in China's economy. The survey conducted by the Organisation for Economic Co-operation and Development (OECD) in 2005 declares that China's economy has been characterised by more private than public ownership for some time now. The private sector's share of industrial output in the national total has risen from 28% to 52% between 1998 and 2003 (OECD, 2006). Although a transformation of state owned and collectives was one of the main reasons to reach this growth, many private firms are achieving a double digit growth per year.

China's reforms have been designed by the central government to progress gradually through experimentation, which is a unique approach in transitional economies. The reform of state owned enterprises was not entirely successful (Chow, 2002), in contrast collective and the private sectors were dynamic and expanding. The growth and development of SMEs in China can be separated into three phases, in line with the transition towards a market economy, as reported by the International Financial Corporation (IFC) in 2000. The first phase was from 1978 to 1983, characterised by the

emergence of individual business (GETIHU), which was limited to up to 8 employees and to consumer goods, vendors, and repairing sectors. The discrimination against other private businesses existed in terms of state policies and regulations against the individual business. The second phase was between 1984 and 1992, distinguished by the rise of Siying (private) enterprises. Also an important sign is that high-tech SMEs in China emerged in the form of collective ownership, and were jointly run by a group of experts and a state owned organisation i.e. a university, or research institute, and local government. The third phase from 1993 to the present is an important turning point for development of SMEs because the institutional environment towards the private sector has become more hospitable.

However, the remarkable growth of China's economy has been resource intensive, relying heavily on physical capital, energy, and natural resources. As a consequence, the environment has become a serious problem across the whole of China, along with growth and development of China's economy. A study on industrial pollution in China reported that industrial pollution accounts for 70% of total pollution, including 70% for waste water, 72% for SO₂, 75% for flue dust, and 87% for solid waste (Wheeler et al., 1999). In recent years, growth has also been associated with increasing inequality between the coastal and the western regions and between rural and urban. The challenges facing China are to adjust its industrial structure, relying more on innovative technology rather than natural resources. The important implication to be drawn from this evidence is that the quality and further growth of China's economy should depend on the technology-based sector. According to China's 11th Five Year Plan (2006-2010), priority is now given to the introduction of advanced technologies, management expertise, and skills, rather than the use of foreign capital. High-tech SMEs are thus becoming a major engine of further growth and development, and play a key role in China's economy (Dahlman and Aubert, 2001; China's Tenth Five Year Plan, 2001).

High-tech SMEs provide value-added products and services and generate a significant profit once they have established themselves in the markets (Bank of England, 1996). High-tech SMEs are able to make contributions to raise the level of the national R&D and innovation by cooperating with state owned research institutes and universities, and applying new advanced technology to their products and services. High-tech SMEs are thus leading a move away from reliance on cheap labour and low profit margins to

value-added and high profit margin goods (Zhu Rongji's speech, 2001). In addition, the growth and development of high-tech SMEs are important for China to create new competitiveness in the global economy. Therefore, high-tech SMEs are playing a key role in the further transformation of China's economy from resource intensive to technology-based industrial structure. Thus it is important to take a look at the evolution and development of high-tech SMEs to identify constraints and opportunities for its future contribution to growth in China's economy.

Innovation is crucial to developing high-tech SMEs since it creates new business opportunities in the markets (North et al. 2000). A key factor for successfully developing high-tech SMEs is the availability of sufficient funds to invest in R&D and innovation. The ability of high-tech SMEs to access sufficient funds is essential to conducting R&D and innovation. Although high-tech SMEs in China have developed rapidly by transferring technology to offer products or services at low costs over the past two decades, this approach is likely to face challenges in the long-term. The ability of high-tech SMEs to access sufficient funds influences the aspirations of high-tech SME owners and their ability to invest in R&D and innovation. Financing thus becomes a critical aspect to the further growth of high-tech SMEs and to achieving innovative advantages. Therefore it is important to investigate how high-tech SMEs meet their financial needs in relation to different stages of their development. Very few studies have looked at the financing of high-tech SMEs in China, even though Chinese SMEs in general have been given more attention by academics and government reports (e.g. Chen and Li, 2006). This is a serious gap in our understanding of the success and failure of high-tech SME development. This thesis seeks to address the gap in the literature relating to financing high-tech SMEs in China and make contributions to the body of knowledge in this field.

Geographically, the growth in the private sector is more concentrated in Eastern coastal provinces rather than in Western provinces. This argument is supported by the evidence offered by the Chinese government: the consumption per capita in the richest region such as Shanghai has been about four times larger than that on average in the poorest provinces in recent years (estimated according to China Statistics Yearbook in 2002, 2003, and 2004). Inequality in economic growth between Eastern coastal and Western provinces has become a major concern, and continues to widen. Thus it is important for

this thesis to examine the differences between the Eastern coastal and Western regions in the financing of high-tech SMEs. The fieldwork therefore focuses on two provinces namely: Guangdong and Guangxi, which are from wealthy and poorer parts of China respectively. Guangdong has experienced faster growth than Guangxi in its non-state sector since the early 1980s. Guangdong has ranked sixth, and Guangxi ranked 28th amongst Chinese provinces in terms of its per capita GDP in 2004 (China Statistic Yearbook, 2005). In addition, Guangdong has ranked first amongst the Chinese provinces in terms of the amount of foreign direct investment (FDI). Although the two study provinces do not provide a representative sample of high-tech SMEs across the whole of China, their experience reveals much about the financial constraints and opportunities high-tech SMEs face in China today.

In order for this study to understand the economic behaviours underlying the financial process, it is important to look at the relationship between demand for, and supply of, finance. This is because the ability of high-tech SMEs to access external finance is linked with the health of financial suppliers. This depends on institutional arrangements adopted by financial intermediaries to guide finance between them. The emerging relationships between high-tech SMEs and financial intermediaries in China differ from that in developed countries and other transitional economies. The economic transformation from a centrally planned to a market-based system has led to imbalances and disjunctures between sectors, particularly between private sector enterprises and the banking system in China. The reforms of the banking sector have been much delayed, and it still operates as a state and concentrated monopoly. An understanding of the relationship between high-tech SMEs and both formal and informal suppliers of finance is important for this study. The school of thought associated with institutional economics provides a set of concepts that are particularly helpful in understanding the emerging relationships within transitional economies. Thus in this thesis a theoretical framework that draws upon the concepts of institutional economics will be developed to interpreting relationships between high-tech SMEs and financial suppliers in China.

1.2 Theoretical background

According to North (1990), institutional economics looks at the relationship and interplay between institutions and organisations in particular economic exchanges.

Institutions are any form of rules including the formal and informal to reduce the uncertainty of human interaction. Formal institutions play a central role and are designed to facilitate exchanges and govern human interaction. Williamson (1985) stressed that formal institutions can be sketched at macro and micro levels in economic activities ranging from national constitutions to institutional arrangements. The macro level is designed and built up by authorities e.g. constitutions, policies and regulations. The micro level is set up by organisations or individuals through contractual arrangements. Informal institutions are typically unwritten codes such as customs, conventions, and traditions that everybody follows (North, 1990). Hodgson (1996) emphasised that habits, routines, as informal rules, are crucial to shape and govern human behaviours. Habits and routines are formed by repeating thought and behaviours, therefore they are durable and self-sustaining. Informal institutions e.g. habits and routines are not principally and necessarily altered in line with changes in formal rules.

Institutional economics has been used by area specialists and historians and recently it has gained popularity as a theoretical framework in academic studies of SMEs in transitional economies (e.g. Smallbone and Welter, 2001; Aidis, 2005). Formal institutions at the macro-level are constantly changing during the period of economic transition, which require formal institutions at the micro-level keep changing in line with them. Furthermore, informal institutions e.g. culture, traditions, and routines need to change to keep pace with new policies and regulations, although informal conditions might lag behind the changes in the formal ones. Thus it is important for studies focused on SMEs in transitional economies to understand changes in both formal and informal institutional arrangements and their interactions. Institutional economics is particularly useful by providing concepts to help interpret economic behaviours under changing institutional environments.

This thesis focuses on institutional arrangements that shape transactions between high-tech SMEs and financial suppliers in the Chinese financial market. The key contribution of this thesis is that it applies an institutional framework to interpreting the relationships between high-tech SMEs and financial suppliers. The contractual arrangements in this thesis comprise both formal and informal criteria that are used to assess loan applications and govern the exchanges. During the period of economic transition, formal arrangements are less likely than informal ones to guide transactions between

organisations or individuals. Firstly, there is a lack of formal and functioning arrangements to guide economic exchanges. Secondly, due to rapid changes in macro-financial institutional environments, formal arrangements used by economic organisations also need to change in line with changes in macro-level. However, the level of implementing formal arrangements is associated with the changes in informal conditions, particularly in state formally owned organisations. The delay of changes in informal conditions (Hodgson, 1996) leads to formal arrangements having difficulties to be enforced. Finally, the conflicts between formal and informal institutional arrangements can lead to formal institutions being not accepted in economic exchanges within transitional economies. Thus, informal arrangements play a more important role than formal ones to guide business activities within transitional economies, although formal institutional arrangements are in the process of changing.

1.3 Research aims and objectives

The aim of this thesis is to undertake an applied study of financing of high-tech SMEs, and to investigate the financial needs of high-tech SMEs in China in relation to different stages of their development.

Defining development stages of businesses is of fundamental importance to studies focused on financing of SMEs generally and high-tech SMEs in particular. This is because high-tech SMEs are in varying positions in accessing external financial sources through different stages of their development. High-tech SMEs at start-up and early stages have relatively poorer access to external finance in relation to their counterparts at later stage. This is because high-tech SMEs at start-up and early stages are perceived to involve a higher level of risk. Although venture capital has been widely recognised as an appropriate source for high-tech SMEs, the effects of venture capital on funding high-tech SMEs varies significantly according to countries and between the development stages. Much of the literature on the financing of SMEs does not distinguish financing between different stages of business development (Bank of England, 1995, 2001, 2002; IFC, 2000) since it is difficult to obtain reliable data on the number of businesses at different stages, this data usually being obtained from banks or collected through conducting surveys. Previous empirical studies focused on high-tech SMEs defined development stages by the age groups of firms (Klofsten, 2000).

However, the problem for this definition is that the age of a firm is no indication of its stage of development and therefore of its financial needs. This thesis attempts to develop a different approach to identifying stages of business development which is more appropriate to analysing their financial needs.

In order for this thesis to achieve the main aim there are a number of subsidiary objectives as follows:

1) To analyse the supply of finance for high-tech SMEs in China, paying particular attention to the potential and current adequacy of the venture capital market (domestic and overseas)

High-tech SMEs are characterised by R&D intensity, thus innovation is an important advantage for high-tech firms. Venture capital is thus considered a more appropriate source than traditional bank finance for high-tech SMEs, particularly at start-up and early stages because of the high level of risk involved but a potentially high level of return. The availability of venture capital to high-tech SMEs influences the size of planned investment funds available for investment in R&D and innovation. Without fundraising from venture capital, SMEs are less likely to be able to develop new technology and transfer new ideas to marketable products and services. Actually the effect of venture capital on supporting high-tech SMEs varies according to countries. Venture capitalists may be less interested in early stage high-tech SMEs in the UK, in contrast venture capital in the US are more likely to focus on early stage investments. The financial market in China is young and underdeveloped, which has remained with substantial government intervention. In general, public venture capital has still to become a major source of finance to high-tech SMEs in China since it has been channelled towards supporting the reform of large state owned enterprises. This thesis attempts to address the extent to which venture capital provides support to high-tech SMEs in China. It also investigates whether private equity from 'business angels' is available to high-tech SMEs in China.

2) To analyse the current relationship between the demand for and supply of finance by high-tech SMEs in China, in order to identify deficiencies in the market

According to the literature focused on financing SMEs in other countries, bank loans form a major source of finance that support high-tech SMEs and SMEs in general at all stages. However, the delay in transforming the banking sector in China from a public to a private ownership structure has resulted in a lag with other sectors, particularly the private sector. The banking sector and high-tech SMEs in China are in different phases of transition to a market-based economy. The preparations to public ownership lead to the banking sector being little interested in serving SMEs, although the relationship with enterprises is in the process of changing. In contrast, high-tech SMEs have experienced rapid growth over the past two decades and are one of the most successful outcomes of economic transformation. The inconsistency in sectoral transformation between high-tech SMEs and the banking sector forms the basis of the emerging relationship between high-tech SMEs and the banks. The research questions raised here are: whether or not high-tech firms are able to access bank finance under the current financial environment? What institutional arrangements are adopted by the banks to secure the supply of finance to high-tech firms? Is there any gap between the demand for, and supply of, finance by high-tech SMEs in China in the current financial market?

3) To evaluate the current role of the government in relation to the support of high-tech SMEs and implications for policy

High-tech SMEs play a key role in the transfer of technology to products and services in the market and make contributions to raise the national level of R&D. However in both developed and less developed countries, start-up and early stage high-tech SMEs have difficulties in obtaining sufficient funds to invest in R&D. Thus governments in many countries offer a range of support aimed at removing financial constraints and raising the level of R&D and innovation. In China governments at national and provincial levels also offer support to high-tech SMEs and have established a number of schemes to funding high-tech SMEs by offering grants, interest free loans, and venture capital. Under the current Chinese financial market, it seems to be more important for governments at different levels to support high-tech SMEs because of the underdeveloped banking sector and financial market. This remains important for this study to evaluate the current role of government in supporting high-tech SMEs and the efforts on overcoming financial constraints and raising the level of R&D and innovation.

4) Assessing the impact of financial strategies used by Chinese entrepreneurs on high-tech SMEs behaviour

The financial strategies used by high-tech SMEs are associated with the sources of finance available, which in turn influence the type of business strategy adopted. It would be helpful to develop an understanding of high-tech SME behaviour underlying financial strategies used by owners of high-tech SMEs. High-tech SMEs in China have been developing rapidly over the past 20 years mainly through a reliance on transferring technology and taking advantage of low costs of production. Without the significant support offered by the banking sector and the financial market, it is difficult for high-tech SMEs to invest substantial investment funds in R&D and innovation and gain technological advantages. What business strategies are employed by Chinese high-tech SMEs to compete with their foreign and domestic counterparts in the market? Are high-tech SMEs that are reliant on cost reduction and application of existing advanced technologies to products able to achieve a long term success?

1.4 The structure of the thesis

This thesis is structured as follows. Chapters 2 and 3 provide a critical review of the literature in the area of the characteristics of high-tech SMEs and their financing in both the Western and Chinese contexts. Chapter 2 focuses on the literature relating to the distinctive characteristics of high-tech SMEs and their financing in the Western context. The purpose of doing this is that the economic transformation from a centrally planned to a market-based system is relatively recent, having occurred over the last three decades in China. The discussions on financing of high-tech SMEs in the Western context benefit from a much longer history, making it possible to distinguish between financial needs of high-tech SMEs at various stages of development. Chapter 3 examines the literature on development phases of the private sector and high-tech SMEs in China. It also reviews the literature on the financial needs of high-tech SMEs and the sources available in the current Chinese financial market.

Chapters 4 and 5 focus on the theoretical framework and research methodology. Chapter 4 develops a theoretical framework drawing on institutional economics, in particular formal and informal institutional arrangements and their constant changes to

interpret the emerging relationship between high-tech SMEs and financial suppliers in China. Chapter 4 also develops a three stage model of business development for distinguishing financing between development stages. In Chapter 5, the research questions are introduced, and the methodological approach for this thesis is developed. High-tech SMEs are defined, and the two study provinces (Guangdong and Guangxi) and two high-tech industrial sectors [Electronic Information Telecommunication (EIT) and Bio-technology (bio-tech)] which form the basis for the primary research are introduced.

Chapters 6 and 7 present the results of analysing the survey evidence. Chapter 6 presents research results emphasising the characteristics of the surveyed firms including their development stage, age, size, management characteristics, and growth. Chapter 7 presents the results of new survey evidence relating to financing and the alternative methods, distinguishing between the financing of high-tech SMEs in relation to the three stages of businesses development in China. It also includes an analysis of the alternative methods employed by high-tech SMEs to remove financial constraints.

Chapter 8 applies the theoretical framework to interpreting the research findings and to distinguishing the relationships between high-tech SMEs and three financial suppliers. It addresses that the relationship between high-tech SMEs and informal suppliers is closer and more advanced than that between high-tech SMEs and the banking system because of different contractual arrangements used by them. The efforts of government support on funding high-tech firms are driven and influenced by the criteria used by government agencies.

Chapter 9 presents the conclusions and implications of the study. It addresses the central research question, deficiencies between high-tech SMEs and the banking sector, and the current role of government in supporting high-tech SMEs. Policy implications relating to the need to restructure the banking system, particularly the role of non-state owned/state controlled financial intermediaries, are developed in this chapter. It also considers the implications for further research.

Chapter 2: Financing High-tech SMEs in the Western Context

2.1 Introduction

The principal reason for reviewing the literature focused on financing high-tech SMEs in the Western context is that the economic transformation in China has been towards a market-based system over the last 30 years in which more than half of economic activities now take place within the private sector. China has gone through its early stage of the economic transition, and a market-based system has been formalised, although there is a gap in the development level and speed between sectors e.g. private sector enterprises and the banking system and the financial market. Government intervention in the economy has been reduced, which has had significant results in terms of reforming the economic structure. The further economic transformation from resource intensive to reliance more on R&D and innovation is underway, and will benefit from drawing ideas and lessons from mature market systems. Therefore it is important to review the literature of financing high-tech SMEs in western countries such as the UK and the US where high-tech SMEs have been successfully developed for a long time. In addition, reviewing the literature of high-tech SMEs in western countries helps to identify the distinctiveness of Chinese high-tech SMEs.

The following section discusses the principal characteristics of high-tech SMEs. Section 3 focuses on financial constraints in relation to different stages of business development and financial sources available in the market. The links between demand for and supply of finance are explored in section 4. Section 5 analyses a range of financial support provided by the government and their effects on high-tech SMEs.

2.2 Distinctiveness of high-tech SMEs

High-tech SMEs are characterised by the application of scientific/technological skills or knowledge to their products and services, although they do not necessarily provide a new product or service to either an industry or economy. Innovation is crucial for high-tech firms to gain commercial success (Mayer and Roberts, 1986; North et al., 2000) as it can create great business opportunities through providing new or differential products and services to the market. Also, cost leadership is important for high-tech SMEs to be able to produce products and services at low costs and compete with their counterparts in the market.

2.2.1 Competitive strategies

Competitive advantages are created by using resources and capabilities to achieve either a lower cost structure or a differentiated product and service. A competitive strategy adopted is influenced by the nature of market opportunities, the nature of products or services, personal characteristics of business owners, and resources available. The following section examines innovative strategy and cost leadership that have been extensively adopted by high-tech SMEs.

2.2.1.1 Innovative strategy

Innovation is often seen as a much more important competitive advantage than those based on price and cost reduction (Porter, 1990) since newly created products and services help to capture and retain market shares and improve the ultimate profitability of the firm. Innovation can be categorised into two levels namely: the radical and incremental. A radical innovation is to develop a new advanced technology and apply it to produce new products and services to either an industry or economy. In contrast, an incremental innovation exploits existing technology and focuses on cost or feature improvement in the existing process, products, and services; which offer a product or service differentiation in the market. Schumpeter (1934) in his seminal work on entrepreneurship and economic development adopted a broad definition of innovation, referring to five types of innovations: modifications to existing products, the

development of new products, recognising a role for the market, sourcing and organisational innovations, and process innovation. Using this, North et al. (2000) in their study of SMEs identified that an innovation could be achieved across five aspects including products and services, market development, marketing methods, production processes, and the technology used in administration.

It has been recognised that SMEs have a higher propensity for innovation than large firms because SMEs are thought to respond more easily and quickly to shifts in demands and changes in economic conditions (North et al., 2000). Much innovation taking place in high-tech SMEs is of the incremental kind since they lack sufficient funds and experts and aim to provide products/services differentiation to the market (Storey and Sykes, 1996; Thwaites et al., 1995; Rosenberg, 1992). In other words, the majority of small high-tech firms are less likely to introduce fundamentally new products and services to either an industry or economy as a whole (Storey and Sykes, 1996). It is crucial for high-tech SMEs making incremental innovation to tailor the products and services to customers specific requirements and to provide after-sales support and services. Although high-tech SMEs in the US do not have a great impact on the national economy compared to some European countries, they are still recognised as a fertile source of innovatory products and services (Bommer and Jalajas, 2006).

Research, based on a survey of 175 SMEs throughout the UK, has found that the majority of small firms applied existing technology in new ways to resolve known problems or to satisfy identified demands (Thwaites et al., 1995). High-tech SMEs tend to offer highly customised products and services to satisfy the needs of individual customers. For instance, small firms that specialise in software programmes are likely to develop products for each customer and provide after-sales support and services. In addition, they tend to develop product-based technology in specific industries where technology has become more complex (Oakey et al., 1988; North et al., 2000). For instance, high-tech small firms are more likely to provide customer-built innovation and devices. In order for them to compete with their large counterparts, they also often offer product and service differentiations to the market especially where products have reached maturity.

2.2.1.2 Cost competitiveness

Cost competitiveness occurs where firms rely on being able to produce the same products or services at lower costs than their competitors (Porter, 2002). Cost advantages for enterprises would lie in the generation of additional income that results from cost reduction, and which may be reinvested in developing new production techniques or new products (Deakins and Freel, 2003). In order to achieve cost advantages, a firm must have a low-cost leadership mindset, low-cost manufacturing with rapid distribution and replenishment, and a workforce committed to the low-cost strategy. A firm with cost advantages can then sell its products either at or below average industry prices to increase market shares and in effect obtain a higher level of profits in return. Small firms with cost advantages are likely to adjust their required profit margins depending on the market competition.

To some extent, it might be easier for large companies to gain cost leadership than for small firms in manufacturing industry (Porter, 2002). The key factor is that large firms are more able to gain economies of scale through bulk purchasing and more efficient investment in production assets, R&D, and advertising. A large company usually offers a significant amount of 'standard' products with relatively little differentiation that are perfectly acceptable to the majority of customers. Although small firms are less able to gain economies of scale compared to large companies, they have more flexibility in trying to reduce costs. Firstly, it is common for small firms to have lower labour costs. For instance, it is widespread for owners of small high-tech firms to perform a range of tasks such as technical manager, marketing manager, and operating manager in their businesses. This can significantly decrease labour costs. Secondly, small firms are likely to adopt alternative methods i.e. outsourcing and employing equipments of other organisations to reduce the amount of investment in fixed assets and R&D. Furthermore, small high-tech firms located in less developed countries find it easier to achieve cost reduction because they can enjoy resources at lower costs e.g. human resources, land, and building. This has prompted many large companies to set up their R&D divisions in less developed countries such as China and India for the purpose of cost reduction.

2.2.2 The owners and investment capital

Owners of high-tech SMEs vary with regard to their financial strategies. Owners of small businesses make decisions on whether firms seek and use external finance available, depending on their personal characteristics. These include five aspects: ambitions for rapid growth of their businesses, attitudes towards sharing equity and relinquishing some ownership control, working experience, technical background, and motives. For instance, the owners who want to retain complete control of their businesses might refuse external equity because of the fear of losing control. In contrast, owners with an ambition of rapidly growing their businesses are likely to raise and use external sources of finance. The entrepreneurs who see the advantages of an efficient team of management are more interested in fundraising from external sources in which the expertises in management are recruited as new partners. The financial strategies adopted by firms in turn influence the choices of targeted financial sources and the capital structure (Oakey, 1988; Smallbone et al., 1995).

A number of empirical studies focused on high-tech SMEs have found that most of owners who had a technical background (Oakey, 1984; Roberts, 1991) were reluctant to accept a high growth strategy (Confederation of British Industry, 1997). Most owners of small firms have never considered external equity as long-term sources of finance because of the fear of relinquishing some ownership control, even though they might suffer from a shortage of investment capital (Norton, 1991; Barton and Matthews, 1989; Cowling et al., 1991). This is because owners of high-tech SMEs are likely to keep the innovative nature of and control on their ventures (CBI, 1997). In other words, they are reluctant to experience restrictions on freedom of action. The founders might also expect that extra expenses would be needed to cover conflicts over strategies and control between founders and new partners. Another empirical study looking at public sector support for innovating SMEs in London's Lee Valley region conducted by North et al. in 2001 has also found that most small firms do not seek external finance because of the conservative attitudes of the owners towards external finance.

There is no agreement in the literature as to whether using external sources of finance is positively associated with business growth (Oakey, 1988). The size of a firm is the key factor as to whether it is necessary to recruit a new partner by using external equity. For

instance, a single owner-manager firm may be effectively operated since new market opportunities might be recognised and responded to in a short period of time. However, when the size of a firm becomes relatively large, a single owner-manager may face challenges in efficiently managing the growing business by themselves (Dewhurst, 1989). Recruiting new partners by using external finance thus becomes necessary for the management of a growing business.

2.3 Financial constraints on growth and development of high-tech enterprises

It is widely considered that investment in high-tech SMEs incurs a high level of risk (Deakins and Philpott, 1994; Ennew and Binks, 1995; Bank of England, 2001), but if they become successful and establish themselves in the market, they have the potential to generate a high return. Potential investors who are looking for a high return will be prepared to accept a high level of uncertainty from the investment in a high-tech SME. The value of high-tech SMEs is linked primarily to long-term growth derived from scientific knowledge and intellectual property (Bank of England, 2001; Hughes, 1996; Moore, 1994). However, a number of previous studies focused on SMEs found that one of the main barriers on starting and growing a high-tech business is a lack of sufficient and appropriate sources of finance (Moore, 1994; Carter, 2003; Cosh and Hughes, 2003). Importantly, the level of financial constraints facing high-tech SMEs significantly vary through different stages of their development (Moore, 1994; Cosh and Hughes, 2003). The following section examines the financial gap relating to SMEs and financial constraints facing high-tech SMEs in relation to various stages of their development.

2.3.1 Financial gap for both SMEs in general and high-tech SMEs

A financial gap for both SMEs in general and high-tech SMEs in particular has been identified for 70 years (MacMillan Committee, 1931) in the UK. Since then there has been a number of changes in the institutional framework to fill the financial gap, as indicated in several official inquiries (Bolton, 1971; Wilson, 1979). On each occasion that the issue has been explored, the value of the gap has been found to be reduced in real terms. Nevertheless, it is still the case today that small firms have difficulties in

obtaining sufficient funds from both equities and loans at low rates of interest (Cosh and Hughes, 2003; Ram et al. 2001; Moore, 1994; Oakey, 1984). Information asymmetries and mismatches between financial suppliers and high-tech SMEs are the main reasons for the existence of the financial gap.

Information asymmetries between SMEs and financial suppliers are one of the most important influencing factors in small business finance. The owners of SMEs are recognised to have more and better information on the likelihood of business success and to evaluate the prospects of the investment project than outside investors (Moore, 1994; Singh, 1994). In addition, information asymmetries can arise in the situation where technology may be insufficiently understood by potential investors. Potential investors may then have difficulties in determining which projects are most promising. Due to strategic considerations, high-tech SMEs are reluctant to provide more information on their research and product development, thus reducing information problem in this case is made more problematic. Financial suppliers may therefore ask either a higher level of interest or expect a higher return as compensation for these agency costs, which may lead SMEs to consider these extra costs as prohibitive. Also, financial suppliers may be cautious to provide investment capital to firms where a risk is perceived. In contrast, information asymmetries between financial suppliers and large publicly quoted companies are much less because financial information produced by independent analysts is widely disseminated to a large group of potential and actual investors within the businesses.

Possible mismatches between financial suppliers and SMEs are another reason to cause a financial gap. Firstly, bank managers tend to be overly cautious in their lending decisions through requiring a high value of security that cannot be satisfied by SMEs, as concluded by the Wilson Committee in 1979. A number of previous studies found that a high value of collateral had been required by the banks until 1990s (Binks et al., 1988; 1990a; 1993). It is apparent that the start-ups and early stage firms have difficulties to access bank loans because of a lack of security required by banks. A possible solution is that the banks charge higher interest to cover the possibility of the loss rather than asking a high value of collateral. Thus the firms that are willing to pay a higher level of interest have a better chance to gain a bank loan (Storey, 1994). Secondly, the amounts of finance required by SMEs might be larger than the financial suppliers are likely to

offer at current market conditions (Deakins, 1996). Presumably, offering a smaller size of funds than that needed by SMEs is perceived to be less of a risk for the funders.

2.3.2 Financial constraints at different stages of business development

A number of empirical studies focused on SMEs in European countries, particularly in the UK, found that SMEs have difficulties in accessing external sources of finance (Carter, 2003; Cosh and Hughes, 2003; Ram et al., 2002; Bank of England, 1996 and 2001; Moore, 1994). Actually, the level of financial constraints that SMEs have varies significantly through different stages of their development because of changes in their position in relation to external sources of finance (Moore, 1994). Also, the level of financial constraints is associated with the amount of planned investment capital in each development stage. The following section focuses on financial constraints faced at different stages of SME development.

2.3.2.1 Financial constraints at start-up

The difficulties in accessing external sources of finance from both debt and equity are particularly acute for start-ups since investments in start-ups are widely perceived as representing uncertainty and a high level of risk (Moore, 1994; Bank of England, 2001; Cosh and Hughes, 2003). Firstly, the start-ups lack the collateral that is required by financial suppliers to secure finance. The assets that high-tech SMEs have are likely to be intangible and consist largely of knowledge and human capital associated with founders, which results in a shortage of physical collateral e.g. tangible fixed assets. The initial capital needed therefore tends to be mainly from the owner's savings and borrowing from their friends and family (Cooper, 1986; Storey, 1992; Shaw, 1993; Moore, 1994). However, self-financing is less flexible and very limited, and therefore less able to meet the needs of the firm for a large amount and medium and long-term finance i.e. investment in a radical innovation or commercialization of new products and services. Thus start-ups can face severe financial constraints, which could prevent subsequent expansion (Moore, 1994; Mason and Harrison, 1994; Garnsey, 1995; Fredriksen, 1997; Westhead and Storey, 1997; Murry, 1998). In addition, a temporal 'financial gap' may occur to high-tech firms when they just spin-off from either public sectors (e.g. research institutes and universities) or large established technology-based

firms. This is because public sectors or large established firms might cease to provide funds, but private investors have yet to be found (Oakey, 2003).

In addition, the level of financial constraints facing start-ups depends on the size of the planned and required investment capital, relating to four aspects namely: industrial sector, competitive strategy, personal characteristics of the owners, and the length of time being at the start up stage, as shown in Table 2.1. These four elements influence the size of the gap between the actual capital demand and what can be financed internally. The level of financial constraints facing start-ups varies according to these four elements.

Table 2.1 The level of financial constraints and influential elements

Four elements	High level	Low level
Industrial Sector	High entrance barriers e.g. the bio-tech sector Science-based sector	Low entrance barriers e.g. business solution ventures Application-orientated sector
Competitive strategy	Radical innovations Innovative strategy	Incremental innovations Cost leadership
Personal characteristics of business owners	Ambition to rapid growth and development of businesses	Keeping small size, retaining business control, and enjoying the innovative nature
The length of time from formation to generating sales turnover	Long lead times from concept to market launch, requiring high front-end development costs	Short lead times from concept to market launch, generating sales turnover occurs relatively early in the company life cycle

Firstly, entrance barriers in terms of the size of initial capital required vary according to industrial sectors. For instance, the threshold of initial capital for the bio-tech industrial sector is higher than that for the business solution sector. As indicated in previous studies, a new product has to go through rigorous testing procedures in a certain period of time and to comply with the regulatory bodies within the bio-tech sector (Moore, 1994; Oakey, 1990) before it is launched into the market. Thus a large amount of initial capital is needed to develop and market a new product in this sector. In contrast, the size

of initial capital is less important than the number of personnel with a strong technical background in a business solution venture.

Secondly, competitive strategies adopted by high-tech start-ups have effects on the level of financial constraints experienced since it influences the size of initial capital needed. The firms that transfer from a new idea or technological invention into marketable products require a larger amount of initial capital than those applying existing advanced technologies to their products or services. The start-ups that undertake a radical innovation are perceived by potential investors to be less certain and involving a high level of risk because an unpredictable level of investment might be continually required. An empirical study focused on high-tech SMEs across the UK in 1984 by Oakey found that private investors are less likely to invest in firms holding an unproven technology and needing about five years or even longer to launch products in the market. This is because potential financial providers have difficulties in evaluating the risk of technologies and marketing, and foreseeing the period of time for the new product launch. Oakey (1995) also found that private investors have preferences for investing in firms that take only two years to generate sales turnover. It is apparent that firms staying at start-up stage for longer than two years face challenges to raise finance. In contrast, firms relying on an incremental innovation can decrease the level of financial constraints since the size of planned investment capital is small and can be met internally.

Thirdly, personal characteristics of the founders i.e. ambitions for rapid growth of their businesses, attitudes towards ownership dilution, technological background, and working experiences can influence the level of experienced financial constraints. For instance, the owners who have a strong technical background and experience of developing products are less likely to seek for and use external equity in which they have to recruit new partners. In contrast, the owners who have ambitions on rapid growth of their businesses are more likely to seek for and use external sources of finance for business expansion. In this case firms might face a continuing financial constraint.

Fourthly, the level of financial constraints facing start-up firms varies according to the duration of a start up stage. The start-ups that develop products and contact initial

customers prior to establishment of their firms have a low level of financial constraints and only need a small size of initial capital. This can be met by internal sources of finance e.g. founders' savings and borrowing from their friends or family. In contrast, the start-ups that take a long lead time to launch products and services in the market face more severe financial constraints because of requiring high front-end development costs. In addition, potential investors normally are reluctant to offer support to start-up firms that need long lead times from concept to market launch, as indicated in the previous section.

There is no agreement in the literature as to whether high-tech firms at start-up face more significant constraints than SMEs in general. A number of previous studies focused on high-tech SMEs claimed that high-tech start-ups are more likely to have problems in raising their initial capital than SMEs in general (Klofsten and Dahlstrand, 1999). However, it has been argued that there is no clear evidence to demonstrate that these difficulties for high-tech SMEs are significantly greater than for SMEs in general (Moore, 1994; Bank of England, 2001). Indeed it appears to be the case that finance offered by banks is more important to SMEs in general than to high-tech SMEs. In contrast, investment funds from venture capital are more appropriate to high-tech SMEs than to SMEs that are not in a high-tech sector (Cosh and Hughes, 2003).

2.3.2.2 Financial constraints at early stage

Financial constraints faced by high-tech firms at an early stage are the availability and costs of funding (Moore, 1994; Bank of England, 2001). Firstly, the early stages still suffer from the lack of tangible assets that are required as collateral by banks to secure a loan. Secondly, potential investors may be less able to judge the technology, quantify the risks, and estimate prospective demands for new products in the market since new products have little or no track record and are largely untested in the market. Thus, traditional banks may still be reluctant to provide funds to the early stages, even if they have the potential to generate a high return on investments. Thirdly, a previous study by Bank of England in 2001 revealed that public equity might not provide sufficient funds to the early stages. The study also indicated that investment of venture capital institutions in start-up and early stage firms have persistently remained at a small proportion of the total funding throughout the 1990s in the UK. In contrast, venture

capital in the US is more likely to focus on the early stages and flourishes in the high-tech sector (Carpenter and Petersen, 2002)

The costs of finance are a key factor in whether or not an early stage firm accepts the external sources of finance available. This is because firms at an early stage remain unprofitable, even if they are producing and expanding (Mayer, 2002). The main concern for an early stage firm is whether or not the costs of external funds are affordable. The early stages are mainly dependent on limited retained earnings, support offered by private equity, and credit from their customers. The proportion of funds from both venture capital and credits given by their suppliers/ customers in total capital is larger in the early stages than in the start-ups (Moore, 1994).

2.3.2.3 Financial constraints at later stage

High-tech SMEs at a later stage do not generally find finance to be a constraint (Cosh and Hughes, 2003). The later stages make use of a wider range of sources than start-ups and early stage firms. Firstly, the later stages are in a better position in accessing bank loans because they have had some time in operation to prove their profitability and success (Bank of England, 2001). The later stages are more able to provide high value of assets as collateral required by banks. Secondly, the later stages find it easier to gain credits from their suppliers and customers since they have proved their capability in the repayment. Thirdly, venture capitalists in the UK are more likely to invest in high-tech firms at the expansion stage according to the report of British Venture Capital Association (2001). However, further finance to expand into new markets, or to invest in further R&D, or to increase productive capability may still be difficult to obtain (Moore, 1994).

2.4 Sources of finance

2.4.1 Bank loans

Much of the literature suggests that bank loans are less appropriate for high-tech SMEs than for SMEs in general at start-up and early stages. A number of empirical studies found that banks are more reluctant to provide loans to high-tech SMEs at start-up and

early stages, even though bank loans are a major source of finance for SMEs in the UK (Binks and Ennew, 1988; Hughes, 1992; Bank of England, 2000; 2001). A survey of 42 firms in the UK by Hayward in 1992, shows that only 7% of initial capital in high-tech firms was obtained from banks, compared to 25% in SMEs in general. Another empirical study, based on a survey of 89 high-tech firms carried out by Cambridge Business Research Centre (CBRC) in 1994, shows that only 7% of their start-up finance was raised from banks, compared with a figure close to 40% for SMEs in general (Storey and Strange, 1992). Empirical studies focused on high-tech SMEs across the US indicate that debt financing was generally insignificant (Carpenter and Petersen, 2002). A research finding, based on a sample of 154 high-tech firms in the US undertaken by Roberts in 1991, reveals that no initial support was provided by commercial banks, although bank credits were available very early on in the life of the company. The recognition that bank loans are less appropriate to young high-tech firms is supported by the theory of information asymmetries. The banks may lack expertise to evaluate technical projects and to estimate the potential of products or services in the market. This recognition is also supported by the distinctive characteristics of high-tech SMEs in which they lack tangible assets and are characterised by intangible assets e.g. knowledge and human capital associated with founders, particularly at start-up and early stages.

A number of empirical studies indicate that bank loans are more likely to be short-term rather than medium and long-term. For instance, Hughes (1992) found that short-term bank loans are much more important to small businesses than either medium and long-term or equity in the UK. However, there is a need of medium and long-term funds in high-tech firms, particularly for those conducting a radical innovation. In addition, the costs of bank loans to both SMEs in general and high-tech SMEs in particular are higher than to large enterprises. It has been explained that a high level of interest would be needed to cover the high costs of loan decision making (Storey, 1993) and to compensate for a loss of loans (Mason and Harrison, 1993). As a consequence, some SMEs might not be able to accept a bank loan as it cannot be affordable.

However, it doesn't mean that banks have lost interest in providing funds to high-tech SMEs. In fact, banks have made efforts by improving their services to high-tech SMEs in recent years. For instance, the major US banks and the UK banking sector have

established venture capital subsidiaries, which are investing increasing amounts of investment capital in high-tech sectors. This development suggests that the banks still play an important role to support high-tech sectors, but does not always involve the provision of direct debt finance (Bank of England, 2001).

2.4.2 Venture capital

Venture capital is investment capital that clearly engages a degree of risk and anticipates long-term capital gain through exploiting market opportunities (Deakins and Freel, 2003). Equity suppliers expect to participate in a success of projects, but without the 'safety net' of collateral. Mason and Harrison (1999, p. 15) gave a comprehensive definition:

"The objective of venture capital is to achieve a high return on the investment in the form of capital gain through an exit, achieved by the sale of the equity stake rather than through interest or dividend income. Exit is normally achieved either through an initial public offering (IPO), involving the flotation of the company on a stock market where its shares are traded freely, or through a trade sale in which the venture capital fund, normally along with all the other shareholders in the company, sell out to another company".

Much of the literature is consistent in claiming that private venture capital (business angels) is the most appropriate source of finance to start and grow a high-tech business (Liles, 1974; Tyebjee and Bruno, 1984a&b; Florida and Kenney, 1988a; So, 2004). Small high-tech firms are more likely to be in receipt of venture capital and supported by private venture capital than SMEs that are not in a high-tech sector. In other words, the rapid growth of firms is likely to attract and attain venture capital (Storey, 1994). A number of empirical studies also support the argument that venture capital plays a more important role to high-tech firms than other firms. For instance, a survey of 2172 firms drawn from both conventional and high-tech manufacturing and services in the UK by CBRC in 2002, found that firms raising finance within a high-tech sector draw 8% of their finance from venture capital equity and 2% from venture capital loans compared with 0.5% and 0.7% respectively for SMEs in general.

In fact, business angels not only offer venture capital but also provide support to high-tech SMEs through their valuable experiences in management. The alliances between owners of high-tech SMEs and business angels provide the means to combine various strengths between them and generate opportunities for business development that might otherwise not be fully exploited. Owners of high-tech firms who have technological background may lack managerial experiences and knowledge in raising external funds. Venture capitalists who have capital and industry experiences are looking for investment opportunities in high-tech sectors. Thus bringing high-tech SMEs together with venture capitalists would have significant effects on combining their strengths and developing high-tech sectors.

Venture capital includes private and public equity. The differences between private and public equity in supporting high-tech SMEs are: first, private equity is more important to provide funds than public equity to the start-ups and early stages and second, public equity may be less accessible for the majority of high-tech SMEs as a source of start-up finance (Bank of England, 2001). The following section distinguishes between the characteristics of private and public equity.

2.4.2.1 Private equity

Private equity comprises business angels and corporate venturing. Business angels are described as investment made by wealthy individuals who are prepared to take a high level of risk and share a high return. Business angels are likely to invest in high-tech SMEs (Cosh and Hughes, 2003) and have preferences for either industrial sectors or development stages according to their experiences and interests. There is no agreement in the literature as to whether business angels have preferences for the start-ups or the early stages. Mason and Harrison (2002) claimed that venture capital is more likely to invest in early stage firms for expansion than the start-ups for initial capital. However, Deakins and Freel (2003) stated that business angels predominately invest at seed and start-up stages and fill a financial gap between self-finance and the stage in which external financial suppliers might become interested. Business angels in the UK typically provide relatively smaller amounts of investment capital, typically less than £100,000 (Mason and Harrison, 1994b, 1996). A survey, based on UK business angels by Mason (2001), reveals that 51% of business angels' investment in the sample

amounted to less than £50,000, and most investments were between £10,000 and £100,000 with just 24% of investments over.

Corporate venturing is an alternative source of private equity finance for high-tech firms. Corporate venturing is that a large company invests a small amount of capital in a high-tech SME for a principally strategic (such as gaining a window on new technologies) rather than an exclusively financial motive (Deakins and Freel, 2003). It appears that corporate venturing makes contribution to both large and small firms. The benefits from corporate venturing to the large company are: first, it enables it to make better use of its own resources; second, it gains accessing new ideas, R&D, and other work that the large firm is interested in; and third, it allows an assessment of potential new markets, and provides the means to exploit potential attractive returns on new technologies. The benefits to the high-tech firm is that they not only obtain venture capital but also access the large company's other resources e.g. production, marketing, and distribution. In addition, an investor in a large company will be in a better position in accessing the viability of an investment in a high-tech business than a venture capitalist or institutional investor. However, there is limited evidence from empirical studies on the extent to which corporate venturing has the potential to fill equity gaps in the provision of early stage finance to high-tech SMEs in the UK.

2.4.2.2 Public equity

Public equity is that private venture capital acts more directly as a provider of venture finance through policy instruments e.g. stock exchange markets and second tier markets. The importance of public equity is that it provides an ultimate 'exit route' and can contribute more to the financing of the later stages. A number of researches have highlighted the special problems facing high-tech firms in accessing public equity in recent years (Bank of England, 2001; Mason and Harrison, 2002). Firstly, it is more difficult to estimate the growth of technology companies. Secondly, the earnings of the investments in a high-tech sector were below the expectation of investors between 2001 and 2004 in general. Thirdly, financial requirements of high-tech SMEs at seed, start-up, and early stages are small amounts of capital and long investment horizons. The size threshold of finance may limit the number of firms that can raise funds through public equity, especially for the start-ups and the early stages. Finally, the investments in high-

tech SMEs that are at seed, start-up, and early stages are perceived to be less certain than other forms of investment. The venture capital in the UK therefore has tended to focus less on early stage investment and more on development capital and management buy-outs (MBOs)/management buy-ins (MBIs). Thus, the conclusion is that public equity might not be a sufficient source of finance to the start-ups and the early stages in the UK. In contrast, venture capital in the US is more likely to focus on early stage investment and bring about dramatic changes in a firm's size.

2.4.3 Financial bootstrapping approach

As indicated above, high-tech SMEs have financial constraints particularly at start-up and early stages. An interesting question that arises here is how start-ups and early stage firms overcome these financial constraints to develop their businesses. Thus it is worth having a discussion of the financial bootstrapping approach that is extensively adopted by SMEs to remove financial constraints. This approach may play a more important role for high-tech SMEs in transitional economies than those in a mature market system.

The financial bootstrapping approach is to make use of alternative methods to meet financial needs or remove financial constraints without relying on formal external sources of finance e.g. loans and venture capital (Winborg and Landstrom, 2000). Firms that have difficulties in accessing external sources of finance or adopt a cost leadership strategy are more likely to employ alternative methods to overcome the financial constraints. The financial bootstrapping approach plays a more important role in supporting young SMEs (Florin and Schulze, 2000; Carter, 2003) than mature firms. Alternative methods adopted are dependent on resources available, business strategies, and the owners' personal characteristics. Alternative methods usually include decreasing labour costs, minimisation of accounts receivable, joint utilisation, delaying payment, and minimisation of capital invested in stock and subsidy finance (Minborg and Landstrom 2000; Carter 2003). However, it has been argued that employing alternative methods may lead firms to delay obtaining external finance for purchasing fixed assets. Furthermore, firms depending on alternative methods may have difficulties in gaining contracts since they may not be able to prove their production capability without having their own fixed assets.

2.5 The links between financial demand and supply

2.5.1 The Pecking order theory

The pecking order theory (POT) was originally suggested by Donaldson (1961) and further developed by Myers (1984) and Myers and Majluf (1984). The theory has been tested by Hughes (1994, 2003) and Myers and Sussman (1999, 2003). The theory studied the hierarchy of adopting alternative financial sources out of those that are available, under imperfectly informed markets. The theory suggests that firms have a ranking of preferences of financial sources. The thesis of seeking finance for SMEs is that internal sources are used first prior to seeking outside funding (Cosh and Hughes, 1994; 1997; 2003; Myers and Majluf, 1984). Owners or owner-managers might prefer internal finance to debt; or more likely to accept debt than equity when the alternative sources are available. The POT also suggests that individual firms may have a different ratio of debt to equity depending upon the matching of their profitability with their investment opportunities (Cosh and Hughes, 1994).

This POT applies to SMEs quite well (Cosh and Hughes, 1994). Owners of SMEs might be unwilling to lose control of business or to be transparent to external bodies; therefore they look firstly for internal funds, then debt and last equity. From the supply side, few potential investors find it worthwhile to provide sufficient funds to SMEs, particularly to start-up and early stage firms without collateral because of information asymmetries. The start-ups may not be capable of providing collateral required by external financial suppliers; therefore they might be forced to be more reliant on retentions and personal funds than more mature businesses (Cosh and Hughes, 1994). The CBRC (1992) identified that bank loans were dominant as the first source of finance sought after internal cash flow. The next most important source was hire purchase or leasing. However, the POT is different for high-tech firms. The hierarchy of financial sources to which businesses adhere may vary according to the level of R&D and innovation. It appears that a science-based firm may have preference for external equity because of a large amount of expenditure on R&D and innovation, especially for US firms conducting radical innovations. The following section explores what types of factors influence the capital structure of firms.

2.5.2 Theory of capital structure

The theory of capital structure studies the appropriate ratio of debts to equity in the long term capital structure of a firm, which may indicate the degree of risk involved. This theory claims that the value of the firm might increase based on the appropriate debts taken to the lenders, but the value of the firm might decrease if the debts continues to rise. For instance, if a company finances itself from a high level of loans, there is a higher level of risk involved. On the other hand, the higher the loans, the more interest that the company will have to pay and that may affect the companys' ability to pay an ordinary dividend. Capital structure choice is influenced by three elements including market, industry, and firm.

Table 2.2 Main influencing elements in capital structure

Elements	Equity preference	Debt preference
Market elements	High interest rates	Low interest rates
	Scarce financial resources	Capital very available
	High stock price	Low stock price
Industry elements	New industry	Mature industry
	Growing	Declining
	High risk	Low risk
Company elements	New company	Existing company
	Large scale vs. available capital	Capital very available
	High risk	Low risk
	Speed is critical	Time is not critical

(Re-produced from Sheehan and Graham (2001))

Table 2.2 indicates that low growth firms with stable cash flow and tangible assets in certain industries have a higher level of debt in their capital structures. On the contrary, high growth firms with a higher risk, uncertain cash flow and intangible assets tend to have lower levels of debt in their capital structures. More profitable firms will have less debt and more equity. This is because they are relying more on internally generated funds, and have less need for external financing. The greater the perceived costs of finance, the less debt financing the company will have as well. Esperance (2003) claimed that capital structure is passively determined by the needs of financial sources. Finally, it is worth noting that capital structure of the firms may well reflect the wishes

and strategies of their owners as much as the constraints placed upon them by suppliers of finance, as recognised in the previous section.

2.6 The role of the public sector

As examined in the previous sections, the difficulties facing small high-tech firms in accessing external sources of finance particularly at start-up and early stages have been gaining more attention in both developed countries (Bank of England, 2001; Klofsten, 2000) and less developed countries. In addition, there has been an increasing recognition of the importance of small high-tech firms to the competitiveness of national and regional economies in terms of offering new value-added products and services, making profits and thereby generating income, and creating better jobs. Furthermore, it has been also recognised that high-tech SMEs in Europe are playing a key role in the transition to a knowledge economy (SME update newsletter, 2006). Thus a number of official reports on the financing high-tech SMEs have called for public sector intervention to overcome the financial barriers facing the firms. Public sector interventions generally aim to start new high-tech ventures, raise the level of R&D and innovation, and commercialisation of new products and services. It includes direct and indirect financial support instruments in many countries.

2.6.1 Direct financial support

Direct financial support implies that governments at different levels provide grants or loans to high-tech firms that satisfy specific criteria. There are a number of financial support instruments available to high-tech firms in many countries. The funds of financial support are from either the public sector or combination of public and private sectors. The funded support designed aims at three aspects: the formation of new high-tech businesses, facilitating R&D or raising the level of innovation, and the commercialisation of new products. The support varies depending on the objectives of policy throughout national or regional structure and the growth of economies. They also vary according to countries, even to geographical localities within a country (Deakins and Freel, 2003). Apart from the availability of the support instruments, another question is what extent the funded support satisfies financial needs of high-tech firms or overcomes the financial constraints facing high-tech firms.

A number of empirical studies have examined the effectiveness of innovation support in the UK. For instance, an innovation support scheme, called the Small Firms Merit Award for Research and Technology (SMART), aims to contribute to a climate which encourages investment in highly innovative technology by individuals, firms, and financial institutions. This programme focused on supporting the development of new technology-based products and originally launched in 1986 in the UK, has been tested for its effectiveness in London (North et al., 2001). The research findings reveal that the Smart Scheme clearly achieves an innovation support amongst a narrow band of SMEs that are more likely to be involved in technical development. However, the evidence shows that the Smart Scheme has been of limited value to innovative support of existing SMEs in London and for the majority of start-ups. In addition, public support funds provided small amounts of finance, which often did not satisfy the need for commercialisation of innovation (Oakey and Mukhtar, 1998). The lack of support for commercial development was also identified since most public and private sectors funding bodies are reluctant to provide the medium and long-term support to high-tech firms (Smallbone and North, 2000).

There is no agreement in the literature as to whether or not the firms would be in a better position in raising external sources of finance after they received public support i.e. grant/loan. For instance, a research finding, based on a sample of 340 firms across Sweden in 1998, indicates that the use of government grants and loans can increase credibility of ventures and consequently improve the chances of obtaining venture capital at a later stage (Klofsten and Dahlstrand, 2001). However, other research, based on a sample of 40 firms in the UK undertaken in 1999 and looking at the UK government Smart Award Scheme and its effects on high-tech SMEs, suggests that at least within a period of two to three years after a Smart award, the Scheme had no significant effects on successfully raising more private funds to support innovation (Smallbone et al., 2000).

2.6.2 Indirect financial support

Indirect financial support takes the form of a range of measures and policies to stimulate provision of finance from private funds to high-tech firms. The indirect support aims to

either improve the certainty of investment in the start-ups by means of public bodies guaranteeing the loans provided by private sector funders or to offer tax relief to investments in high-tech firms. For instance, the Loan Guarantee Scheme has been designed and introduced in 1981 in the UK, which aimed to overcome a perceived gap in the availability of loan finance for SMEs. However, the evidence shows that only 2,514 loans (some 6%) out of the total 41,000 were awarded to companies operating in the high-tech sector during the period from 1986 to 1996. Therefore, it has been argued that the Scheme has been less successful in stimulating finance for high-tech firms than might have been expected (Bank of England, 2001).

A number of the official reports on the financing of high-tech SMEs also suggest that innovation should be more favourably treated by the tax system. Thus several schemes aimed at decreasing the tax burden are available to high-tech SMEs in the UK e.g. Capital Gains Tax, Taxation of corporate venturing, and Tax credit for R&D. For instance, an R&D tax credit was introduced in 2001, and aimed to encourage firms increasing R&D and innovation expenditure. The scheme makes high-tech firms to be able to receive partially refundable tax credits (worth 80% of the total value of the tax credit) in respect of their R&D and innovation spending. In addition, a research finding, based on a sample of 5,910 SMEs over the 1993-1996 period in the UK, reveals that high-tech SMEs pay proportionately higher taxes (as a percentage of total assets) than their low-tech counterparts (Michaelas et al., 2000). It implies that the tax system disproportionately impacts on financing of existing high-tech firms and hampers their growth potential. These findings also suggest that high-tech SMEs need to be supported by offering fiscal measures e.g. tax holiday to overcome financial constraints.

2.6.3 Science Parks and Finance

The concept of a science park/a high-tech industrial zone is derived from the US where the first science park was developed by Stanford University, California in the early 1950s. Since then science parks/high-tech industrial zones have been developed rapidly in many countries. Science parks or high-tech zones represent a mechanism to spur technological innovation and economic growth, create and sustain the capability of developing new products and processes which can compete in international markets. The parks or zones are designed to offer a better business environment that would help

the formation of new high-tech SMEs and foster the growth of existing high-tech businesses (Deakins and Freel, 2003), thereby contributing to the growth and development of national and regional economies. The parks or zones tend to meet the needs of high-tech sectors in relation to real estate, transportation, telecommunication, human resources, and high quality working environment. The attention paid here is how the parks or zones tend to help high-tech SMEs to gain access external finance and provide financial support to them.

As examined in the previous section, investments in high-tech firms, in particular the start-ups and the early stages, are perceived to be less certain and involve higher levels of risk. This may be because potential investors lack knowledge in assessing fund applications for innovative projects. In order to improve the relationship between potential suppliers and high-tech SMEs, the parks or zones become the informal network that brings business angels, venture capitalists, and professional firms together with entrepreneurs. This close proximity allows for high-tech SMEs to benefit from the spread of ideas and the expertise of the other companies and financial institutions around them. By establishing science parks/high-tech industrial zones, governments, universities, local authorities, and various financial institutions have actively attempted to encourage the formation and growth of high-tech firms (Westhead and Storey, 1994). Science parks/high-tech industrial zones might at least reduce the gap of start-up capital since well-developed parks/zones could improve mutual understanding between high-tech firms and potential investors (Bank of England, 2001). Silicon Valley in the US is a successful example in this case. Furthermore, evidence from a survey of 38 firms in Cambridge undertaken in 1998, shows that the majority of bio-tech firms have received support in obtaining venture capital and flotation on markets from the Cambridge bio-tech cluster (Wicksteed, 2000). In other words, the Cambridge Cluster as a brand is useful for venture capitalists to understand a bio-tech industrial sector and make an investment in the sector. Thereby high-tech SMEs that are located in the parks or zones benefit from obtaining investment capital from the public sector.

2.7 Conclusion

Drawing upon literature from developed countries, this chapter has shown that high-tech SMEs are characterised by a high propensity to innovation, have major assets related to

knowledge and human resources associated with their founders, and limited tangible assets in start-up and early stages of their development. Studies focused on financing high-tech SMEs consistently report that they have problems in obtaining finance. There is a financial gap for SMEs in general and high-tech SMEs in particular according to several official reports dating back to the 1930s. The difficulties in accessing external sources of finance vary significantly through various stages of business development. The start-ups and early stages are less able to access external sources of finance, and thus are dependent more on self-finance including owners' savings and borrowing from friends and family as well as any retained earnings. Loan finance can meet some of the financing needs of high-tech firms but is less important compared to the provisions of loans to SMEs in general in the UK; which relates to distinctiveness of high-tech SMEs. Venture capital is widely considered an appropriate source of finance to high-tech SMEs, particularly science-based firms involving high expenditure on R&D and a long period of time before commercialisation, since this form of finance allows the investors a share in the success of the project, and avoids the cash flow problems associated with debt finance. Venture capital in the UK prefers MBO stage investment to start-up and early stage investment, in contrast extensive venture capital in the US focuses on early-stage investment. This relates to the development level of venture capital between the UK and the US. The preferences of venture capital for mature high-tech SMEs in the UK have largely featured in the debates on equity gaps to high-tech start-ups. Business angels are unlikely to invest in technology projects unless they are experts in the technology aspects. The effectiveness of public financial support on innovative capabilities of high-tech SMEs is partial.

The availability of financial sources to high-tech SMEs depends not only on the characteristics of high-tech SMEs and various stages of business development but also on financial and business environments where the firms are embedded. It appears that institutional environments for businesses in China are different from those in developed countries. The following chapter turns to review the literature focusing on financing of high-tech SMEs in China.

Chapter 3: Private Sector /High-tech SMEs and Finance in China

3.1 Introduction

Having in the previous chapter reviewed the literature on financing high-tech SMEs in the Western context, this chapter focuses on the distinctive characteristics and financing of the private sector in China in the context of the economic transformation from a centrally planned to a market-based system. An understanding of the development phases of the emerging private economy and the evolution of the banking sector is vital to understanding the financial strategies used by the private sector including SMEs in general and high-tech SMEs in particular. Under the changing institutional environments, funding the private sector is different from other countries and varies through the various phases of China's economic transformation. For instance, the difficulties private firms faced in obtaining bank loans have been mainly caused by policy and regulative ambiguities rather than business matters. The development of private enterprises and their financial needs have been the subject of numerous ideological biases and policy constraints, compared with the policies for state owned enterprises. Although the political and economic environments for the private sector have become more hospitable, the private sector still receives only limited support from the banking sector and the financial market.

The following section reviews three development phases of the private sector in terms of policies and regulations offered by the central government relating to SMEs. It focuses on financial sources actually used by the private sector including high-tech SMEs. Section 3 examines distinctive characteristics of high-tech SMEs in China. Section 4 focuses on the financial needs of high-tech SMEs. Financial suppliers including venture capital, the banking system, and private sources in China are explored in section 5.

3.2 Distinctive characteristics of private SMEs

It is necessary to start with the distinctive characteristics of private enterprises because the majority of SMEs in China including high-tech SMEs are now privately owned. Also, previous studies have been mainly focused on the private sector given its rapid development over the last 30 years. The following section highlights the development phases of the private sector since the nature of business performance is sensitive to both official attitudes and legislations relating to the private sector.

3.2.1 Financing and the private sector

The private sector in China was experimentally developed because economic transitions in China have been designed by the government to progress gradually. Thus SMEs have been developing under an environment of political, legal, and regulatory uncertainty (International Finance Cooperation, 2000). The development of the private sector can be separated into three phases in terms of policies and regulations relating to the private sector, as reported by International Finance Corporation 2000: the first from 1978 to 1983, the second between 1984 and 1992, and the third from 1993 to the present.

Phase 1: 1978--1983

The private sector including individual business(GETIHU)/private enterprise (SIYING QIYE) was first recognised during the early phase of economic reform between 1978 and the mid of 1980s. The private sector was limited to individual businesses with less than 8 employees and was limited to the consumer goods and service sectors mainly consisting of vendors and repairing. It was not recognised by the state as an important component of the economy and played only a minor role of supplementing the state and collective economy.

Discriminations against private businesses were apparent during the first phase in terms of the legal position and the official attitudes towards private firms. For instance, a significant proportion of the owners in the private sector were people with difficulties in obtaining other employment since they either had a criminal record or their family had

political problems. Owners of GETIHU were considered to be unqualified and lacking skills in the beginning of China's 'reform and opening'. The shortage of consumer goods and lack of services in the communities created great business opportunities for GETIHU to generate significant profits and accumulate considerable personal wealth.

Phase 2: 1984—1993

The sign of phase 2 was the rise of the privately run enterprises which should be distinguished from individual businesses. Such enterprises are characterised by privately owned assets, more than 8 employees, and registered with sole ownership, partnership and limited liability incorporation (the State Administration of Industry and Commerce, 1989). The ownership structure was a key factor for firms to access state owned resources and avoid official barriers erected to restrict the entry of private enterprises e.g. land, tax reductions, and bank loans—that were more readily made available to collective and state owned firms (the World Bank, 2000; So, 2001; Liu, 2002). In addition, private firms were less likely to be accepted by suppliers and customers in terms of their reputation, quality of the products, and after-sales services. In order to take advantages of state ownership structure, private enterprises preferred to take one of four collective forms including 'red hat' firm, rented collective, shareholding firm, and foreign investor joint enterprise during the period of phase 2 between mid-1980s and the first half of the 1990s.

A form of private firm was called 'red hat', meaning that the owners of private firms put on a hat of collective ownership to evade the government's prohibition to private firms and its ideological harassment. It could be realised by paying administration fees to its supervisory agency¹ which could be a state or collective unit, or local government organisation. To some extent, it could be in the interests of a supervisory agency because they benefited from contracted profits or management fees. Private firms with 'red hat' might also find it easier to access external sources of finance than those without the hat. The collaterals to secure bank loans depended mainly on the reputation

¹ Supervisory agency means that a state owned organisation including local government, university, research institute, and state owned enterprise jointly owned a firm with individuals officially, but didn't involve in running the business. By doing so, supervisory agency could benefit from charging contracted profits and management fees.

of the supervisory agency rather than the tangible assets of the firm as those agencies were state owned units. In addition, supervisory agencies might offer spare offices and equipment free or at low costs. Low taxes or tax exemption could be other benefits from the distinctive ownership structure as some agencies were able to take advantage of tax regulations (Baek, 2000). It could be concluded that rapid growth of the private sector partially benefited from taking advantage of the regulatory reforms.

Regarding high-tech SMEs, the central government in the mid 1980s began to encourage commercialisation of scientific research. The Chinese Communist Party (CCP) Central Committee promulgated a “Decision on Reform of the Science and Technology Management System”. The decision launched an attempt to create a ‘technology market’ to link scientific research with industrial production, encouraging voluntary collaboration between state owned research institutes /universities and existing enterprises in order to hasten the commercialisation of R&D and improve technological innovation by enterprises (Deng Xiaoping’s speech, 1984). At the same time, universities, state owned research institutes, and their personnel were given permission to set up their own profit-seeking organisations. The high-tech SMEs that emerged those days were usually registered as collective ownership and in practice were jointly owned by individuals and universities or research institutes. The distinctive high-tech SMEs have expanded rapidly and have accumulated a significant capital for further investment i.e. in R&D. However, this type of high-tech SMEs resulted in the triangle debts² and the disputes between the individuals and the supervisory agencies about responsibility for the debts, which became a serious barrier for the further growth of high-tech SMEs. Also, a large amount of non-performance debts were created between enterprises or enterprises and state owned banks. When a further transformation was needed to resolve the disputes and regulate the business activities, phase 3 started.

Phase 3: 1993 to the present

This phase is an important turning point in official attitudes towards the role of the private sector in China’s economy. Firstly, Deng Xiaoping’s famous southern tour in September 1992 when he called for a continuing of the reform changed official attitudes

² Triangle debts mean that both owners and their supervisory agencies did not take responsibility for the debts because of the unclear ownership structure. As a result, nobody did the repayment.

towards private firms by providing a more hospitable business environment. Secondly, the 15th CCP Congress recognised that private enterprise was an important component of the economy and allowed the sales of state-owned enterprises to the private sector in 1997. Thirdly, the President, Jiang Zemin, emphasised that the CCP would select and absorb successful private entrepreneurs who accept the creed and constitution of the CCP and are willing to make contribution to the party in 2001. Finally, the promises to the World Trade Organisation (WTO) undoubtedly helped to remove the discriminations against the private sector since China joined the WTO at the end of 2001.

This phase is a milestone since the economic environment for private enterprise became more stable and legitimate. The private ownership of enterprises has been acknowledged since 1999 and the private sector has been formally recognised. It was the right time for private businesses with 'red hat' to take off the 'hat' through the new business legislation. By the end of 2000, the total size of the private sector was more than 312.5 million enterprises, including 1.76 million private firms and 310.74 million individual businesses (the Yearbook of National Statistics in China, 2001). The operational efficiency of private enterprises is much higher than state-owned and collective enterprises in terms of sales turnover and profit making because of self motivated management and risk-taking (the World Bank, 2000; Liu 2002; Yang, 2004). However, a survey undertaken by the International Monetary Fund in 1999 indicated that the funds invested in the private sector accounted for just 1% of total bank loans, and only 1% of private firms listed in the domestic stock market, even though the private sector had grown to 27% of GDP. It implies that private enterprises were less able to access public funds, compared to state-owned firms, even during the third phase.

This phase is also a turning point in that the political status of private entrepreneurs has been enhanced significantly. As shown in table 3.1, the results, based on a series of nationwide surveys of private entrepreneurs in China in 1993, 1997, 2000, and 2002, show a change in the occupational status of private entrepreneurs prior to establishing their private businesses. Whereas most entrepreneurs were drawn from the lower group of workers comprising those from manufacturing as well as commerce and service, farmers, and craftsmen, they are now drawn mainly from the higher occupational groups, including professionals, people in charge of government agencies and institutions as

well as public and economic organisations, and people working in the army. Table 3.1 shows that owners of private firms were mainly from the lower occupational group (53%) prior to 1993, but by 2001 about 70% were from the higher occupational group. This trend implies that the owners of private firms have been accepted significantly in the society because of the political and legal status changes. The entrepreneurs with previous working experience would be more able to access resources or distribute their products and services by using their personal social networks. Furthermore, private entrepreneurs who have been elected to be the senior representatives of People's Congress at national and provincial levels were 48 and 372 respectively in 2001 (Liu, 2002).

Table 3.1 Last occupation prior to the private owners

Last occupation	Prior to 1993	1993-1996	1997-1999	2000-2001
Professionals	11.1	3.9	10.4	3.8
Officers in government	21.3	27.6	44.9	66.3
Workers	31.6	8.6	17.6	11.1
Farmers	12.3	4.4	5.0	1.4
Unemployment	0	11.4	2.6	0.5
Getihu	8.6	27.4	14.9	11.3
Craftsmen	9.1	-	-	-
Army	1.0	0.2	0.3	-
Other	5.0	16.5	4.2	4.7

Sources: Occupational surveys by the Department of United Front of the Central Committee of Chinese Communist Party (CCP) in 1993, 1997, 2000, and 2002

3.2.2 Key Characteristics of Finance

According to the survey of 628 private enterprises in China by the World Bank in 2000, financial constraints were identified as the second most frequently identified problem after the weak market demand (the World Bank, 2000; Tam, 2004). The discrimination against private firms in terms of institutional biases before 1993, particularly during the first phase, was the main reason to cause difficulties in accessing bank loans. Despite the private sector being legitimatised by the central government in 1997, private enterprises still continue to experience more difficulties in obtaining bank loans. This was because state-owned commercial banks were required by the Chinese Central Bank

to take responsibility for their profits and losses in the second half of the 1990s. As a result, the banks asked for a high marketable value of security, which resulted in the failure of many private firms to provide sufficient collateral. This was exacerbated by the Asian Financial Crisis in 1997. Furthermore, there was no provision made for private SMEs in terms of the loan quota system from the banks that has been put in practice since 1997. In contrast, state-owned enterprises, even if they had been partially privatised, have been better able to access external source of finance from the banking sector and the financial market.

The financial sources used by private enterprises varied through the three phases of development of the private economy. Table 3.2 shows that the shares of bank loans / mutual credit funds in total investment capital accounted for 41% in 1987, 10.7% in 1993, and 0 in 1997; in contrast the shares of capital from principal owners were 37.5% in 1987, 45.3% in 1993, and 69% in 1997. It shows that the proportion of the funds coming from private sources has increased, in contrast the shares of bank loans /mutual credit funds decreased between 1987 and 1997. The table also shows that whereas a fifth of private businesses were owned by families in 1987, this has been replaced by joint ownership by a group of individual partners by 1997. The main reasons for these changes are as follows:

Firstly, it might reflect that private enterprises with a 'red hat' found it easier to access bank loans /mutual credit funds before 1993, as noted in the previous section since the banks mainly provided funds to state-owned or collectives before 1997. Secondly, private owners were generally from the lower occupational group prior to 1993. They therefore had accrued only a small amount of savings that could be used as capital to invest in their private enterprises. Thirdly, since 1997 the state-owned banks asked for a high value of collateral that private firms couldn't meet since the banks had become preoccupied with the reduction of non-performing loans (Nanto & Sinha, 2002). In addition, even when private firms were able to provide fixed assets to secure loans, the costs of assets registration and application charges were prohibitive and represented an obstacle to obtain a bank loan (Tam, 2004). For instance, registration of a property must be evaluated within a number of different departments and therefore takes a long period of time for the process to be completed. The official recognition from the property owner's agreement, property evaluation, registration, insurance, to notary certification

can take from several weeks to several months (Shanghai Association of Commerce and Industry, 1999).

Table 3.2 The Shares (%) of Financial Sources Used by Private Enterprises

	1987	1993	1997
Capital from principal owners	37.5	45.3	69
Capital from partners	-	12.1	24.9
Loans from friends and family	20	16.2	-
Funds from employees	1.9	-	1
Bank loans/mutual credit funds	40.6	10.7	-
Others	-	15.7	5.1

Sources: Chinese Government and Private Economy, the China Federal of Industry and Commerce Press 2000

Fourthly, there was a decrease in the number of cases where governments at different levels intervened in decisions about loans because the banks had become responsible for their own profits and losses since 1997. A key target of the banking system was to reduce the high level of non-performing loans, therefore they became risk averse and over cautious about agreeing to offer a bank loan. Finally, significant personal savings from potential entrepreneurs were more available by 1997 since personal wealth had been accumulated for a longer period of time.

3.2.2.1 Accessing Financial Sources for Start-up

It is not surprising that the majority of private firms depend heavily on self-finance to start up their businesses. Research based on the survey of 628 firms undertaken across Beijing, Wenzhou, Shunde, and Chengdu by the World Bank in 1999, indicates that firms rely heavily on self-finance to start up their businesses. More than 90% of the initial capital came from the principal owners, start-up teams, and their family and friends. The proportion of self-finance in total initial capital even exceeded 95% in Beijing and Wenzhou (the World Bank, 2000). Although bank loans and venture capital were available, few start-ups had obtained these external sources. Chinese entrepreneurs have to rely to a greater extent on personal savings and insider financing for start-up capital than their counterparts in other transition economies (IMF, 1999; the World Bank, 2000). For instance, about two-thirds of start-ups in the Czech Republic appear to

receive bank loans, and even in Vietnam, 5% use commercial loans within the first 6 months after registration (the World Bank, 2000).

This may relate to several elements. Firstly, firms with a 'red hat' that already were established were required to re-register as private firms according to business law in 1999. Therefore, less initial capital was needed for those firms since they had been generating sales turnover and making profits. Secondly, more personal wealth has been built-up since China's 'reform and openness' in 1978, which could be invested in private enterprises as loans and /or equity. Thirdly, financial intermediaries might have little interest in providing funds to both private and state owned firms since they were asked to restructure the banking system and focus on reduction of their non-performing loans.

3.2.2.2 Accessing Financial Sources for Post-start-up

The investment for expansion continues to depend on internal finance including self-finance and retained earnings in China (IMF, 1999; the World Bank, 2000). The survey indicated above shows that retained earnings and funds from principal owners accounted for 52% of total finance in 1995 and 62% in 1998. External sources of finance including informal channels, bank loans, and credit unions are about equally represented. External equity including public equity and debt has not made a contribution to private enterprises (the World Bank, 2000; Liu, 2002). The extent to which bank loans were used varied regionally. For instance, bank loans were more important for private firms in Shunde, Chengdu, and Wenzhou than for those in Beijing. The main reason given by the study is that a smaller proportion of firms (14%) applied for a bank loan in Beijing than those in other cities (more than 50%), which suggests that firms in Beijing deterred from bank finance generally. It also suggests that the relationship between the firms and the banks in Beijing was less important than that in other cities. Informal channels e.g. individual investors and listing firms played an important role to support SMEs in all cities, particularly in Beijing (the World Bank, 2000).

The survey also showed that the importance of internal sources varied according to the employment size of enterprises. Internal sources tended to become less important in the

case of larger firms (the World Bank, 2000). The share of bank loans increased with the firm's expansion and became the dominant external source of finance for larger firms. In contrast, the smaller firms had more difficulties in gaining bank loans.

3.3 Distinctive characteristic of high-tech SMEs

The high-tech sector has been widely considered a new engine to the further growth and development of China's economy (Zhu Rongji's speech, 2001; Dahlman and Aubert, 2001). Governments at different levels have offered incentives and provided a range of support to start and grow high-tech SMEs by transferring personnel, technical and financial assets from public institutes to high-tech SMEs since the middle 1980s. A more friendly environment for small high-tech businesses has been formalised in terms of resource allocation and industrial policies. High-tech SMEs therefore have developed rapidly in terms of the number of businesses and annual growth of sales turnover. The majority of high-tech SMEs in China are likely to rely on application of existing technology to offer differentiated products and services, which seems to be similar to high-tech SMEs in western countries, as noted in Chapter 2. However, the distinctiveness is: first high-tech SMEs achieve cost advantages, although this will only be an advantage if they compete with western high-tech SMEs and second, high-tech SMEs in China mainly serve the national, regional, and local market, and modify new products launched in developed countries to adapt to Chinese customers' requirements.

3.3.1 Cost Leadership

Cost leadership is one of the most important strategies for high-tech SMEs in China (Li et al., 1999), although innovation is crucial for high-tech firms as noted in the previous section. Of most importance to high-tech SMEs is to be able to respond to and seize market opportunities quickly, and offer new products and services with a very attractive price to the Chinese market relative to foreign competitors. Compared to multi-national companies originally from developed countries and large state owned or public enterprises, high-tech SMEs are more dependent on the application of existing technology to products and services and responding to new business opportunities quickly. High-tech SMEs focus more on either the national or regional (i.e. several provinces) and local (single province) market by producing adaptive products in relation

to high-tech SMEs in developed countries. As declared by a previous study, one of the achievements during the early 1990s was the adaptation of English-language-based computer and information technology to a Chinese-language context (Gu, 1996).

The majority of high-tech SMEs achieve cost leadership by applying existing technology to products, employing cheap labour, and using personal contacts in accessing local markets. Firstly, an abundant supply of low-cost but well-educated labour with technological background is available to enterprises in China. The average wage for high skills labour in inland China is still lower than in developed countries and regions such as Hongkong and Taiwan, although the gap has been reduced over the past 20 years. For instance, the average monthly software engineer's wage was US\$1500 in Taiwan, but US\$600 in the coastal region and US\$400 in the western region in China in 2004. Secondly, the ways of cooperating with state owned research institutes and universities for R&D and innovation purposes vary according to investment capital available. For instance, it is possible for founders to undertake R&D by cooperating with public research institutes or universities with low costs until the R&D has been commercialised in the market. Finally, personal contact of owners with local communities and the local government could be one of the influential factors to gain low costs of resources e.g. land and building.

3.3.2 Little Investment in Technological Development

High-tech SMEs produced only a small proportion of technologies in the domestic technological market (Segal, 2003) because of little investment in firm-led technological development. It is worth outlining here the characteristics of industrial technology innovation in China. Before the 1980s, technological activities that focused mainly on the hardware manufacturing orientation for military and scientific research purposes were conducted by state-owned research institutes and key universities, but were controlled by the government. It appears that R&D and innovation were not efficiently transferred to industrial enterprises because of a lack of market driving force. Since the late 1980s, in order to commercialise R&D and innovation and develop a high-tech sector, the transfer of personnel, technical and financial assets from public institutes and universities to high-tech SMEs was allowed and encouraged by the national government. As a result, spin-off high-tech enterprises emerged, and an

enterprise-led R&D system built up through the integration of domestic technological capabilities and utilising international technological sources. A survey of 234 high-tech firms located in Zhongguancun in Beijing in 2006 shows that the firms get new ideas from developed countries, and then design and generate new products based on absorptive capacity (Liefner et al., 2006).

It seems that absorptive capacity is crucial for the majority of high-tech SMEs to create differentiated products and services for the domestic market. Absorptive capacity is defined as “the ability to recognise the value of new information, assimilate it, and apply its commercial ends” (Cohen and Levinthal, 1990). In fact, the majority of high-tech firms have a strong ability to generate adaptive products based on existing or importing technology from overseas (Baek, 2000) rather than developing an original innovation. It is more efficient for the majority of high-tech firms to utilise existing or imported technology than independently developing a radical innovation because of the time commitment involved and the lack capability to do so (Baek, 2000). In addition, co-operating with leading firms in the industry would raise the level of technology innovation. For instance, high-tech SMEs that specialise in software projects in China would obtain technology transfer benefits by doing outsourcing work from the US or Japanese companies because the average level of technology in producing computer programmes is still relatively low in China.

The economic environment in China could be another influencing factor that impacts on the aspiration of individual investors, particularly for medium and long term investments. As noted in the previous section, macro policies and regulations over the private economy have kept changing, which resulted in an unstable business environment. Thus many owners focus more on short-term profits seeking rather than long-term success of their businesses since they might not have confidence of conducting medium and long term projects. As a consequence, individual investors might be unwilling to provide a medium or long term fund; but a radical innovation usually needs long term investment, as noted in Chapter 2.

The consequences of low investment in technological development are: from a positive perspective, first, it avoids the large amount of investment needed and second, transferring technologies might ensure high-tech SMEs offer their products and services

to market quickly. From a negative perspective, first, it involves the risk of becoming dependent on foreign technology and second, high-tech SMEs may not be capable of going beyond the national boundary (Hong, 2003). Furthermore, high-tech SMEs might face daunting barriers to the long term success and competitive advantage of their businesses (Gu, 1997) since innovative advantage is more important than cost leadership based on lower labour costs or cheaper materials (North et al., 2000).

Although an enterprise-led R&D system has been built up gradually over the past 20 years, a major obstacle restricting the development of high-tech SMEs in China is technology diffusion. So far most technology diffusion agencies e.g. state-owned research institutes and key universities have been converted from former government-affiliated institutes, but are now largely controlled by central government ministries. Private enterprises were not able to be involved in technology diffusion, contributing to difficulties in achieving a common agreement between technology developers and potential users about standards and technological compatibility. As a result, a chance of developing and applying technology to products could be limited by barriers to technology diffusion in China.

3.4 Financial needs of high-tech SMEs

The investments in high-tech SMEs in terms of amount and period have been affected by the changes in the political, legal and regulative environment (IFC, 2000). High-tech SMEs would adopt different business strategies in response to the changes in sources of finance available and the attitudes of officials towards high-tech firms. The initial capital was from supervisory agencies at the very outset of the development of high-tech SMEs in the mid-1980s. Then funds from founders and partners of high-tech firms became a major source after the second half of the 1990s, particularly after 2000. Financial bootstrapping in response to state policies has been utilised by high-tech SMEs at three phases of the development of the private economy.

3.4.1 Financing high-tech firms in two phases

The period from the mid-1980s to the first half of 1990s

The high-tech SMEs that first emerged in the mid-1980s were founded by state-owned research institutes or universities and were usually operated by a group of academic staff working in the same research institutes or universities. It was for this reason that the initial capital for high-tech SMEs came mainly from the agencies such as universities and state owned research institutes. A fact that academics and engineers did not have sufficient savings for the initial capital to set up their own high-tech businesses, was another reason for founding high-tech businesses by state-owned organisations. For instance, a particular private company, Stone, relied on a loan of RMB 20,000 Yuan from Sijiqing Township for its initial capital in the early 1980s. Another company, Legend, obtained RMB 200,000 Yuan of start-up funds in the form of a loan from Institution of Computing Technology of Chinese Academy of Sciences in the early 1980s (So, 2001). In other cases, initial capital was in the form of either equity or a loan from state-owned institutions. This type of high-tech enterprise was considered a state-holding company, with full management autonomy. Another reason for this was to avoid being discriminated against in accessing external sources of finance, and to find it easier to be acceptable in the market. However, this type of enterprise had difficulties in clarifying property rights relating to the profits distribution and triangle debts after they had already taken off and had become profitable (the World Bank, 2000; So, 2001; Liu, 2002).

A method used to make profits and accumulate capital at the very outset in the development of high-tech SMEs was to resell imported high-tech products and provide after-sales services in the domestic market. This method was used to avoid the large amounts of initial capital needed and to take advantage of the technical knowledge of academic staff. It allowed the rapid accumulation of large amounts of capital for subsequent growth of high-tech enterprises during the period of mid-1980s. Legend that became the world's third-largest PC company with approximately US\$12 billion annual revenue in 2003, is a successful example of using this method, although it is admittedly an extreme case.

The period from the second half 1990s to the present

The funds from individual founders have become a major source of finance for high-tech firms since the second half of the 1990s, particularly after 2000. During this period, funds for starting up a high-tech business were usually provided by the founders and their family members, relatives, friends, and foreign investors. In other words, high-tech SMEs in China now depend heavily on informal sources of finance to start up their businesses. Established enterprises continue to rely on internal sources including retained earnings and self-finance, with external sources of finance being insignificant even at a later stage of development (So, 2004).

Funds from venture capital and business angels have yet to become major sources for high-tech start-ups. Although a second board in the Shenzhen Stock Exchange for listing high-tech companies was approved in May 2004, only 10 high-tech firms have opportunities to be listed in this market during the year based on the annual quota for the total number of enterprises. It would appear that the second board in the domestic stock market is not sufficient to meet the financial needs of high-tech firms. A few enterprises were fully funded by venture capitalists from the US in 1998 and 1999. This, however, occurred before the fall of NASDAQ and economic slowdown in the US. As yet, overseas stock markets do not play an important role in serving high-tech SMEs in China.

3.4.2 Financial Bootstrapping in Response to State Policies

Financial bootstrapping in response to state policies is defined in this research as firms taking advantage of state policies to meet their financial needs. The methods utilised by high-tech firms varied through the development phases of the private economy, which depended on the nature of firms and policies and legislation introduced by the national government. Financial bootstrapping was used extensively by high-tech SMEs not only at the beginning of the economic reforms but also at the present time. It could be achieved by several means.

Firstly, some high-tech firms that did not jointly operate with foreign partners registered as foreign joint ventures to take advantage of tax reduction. In order for China to attract

foreign direct investment, the government offered joint venture tax relief during the first three years after establishment. Secondly, in order for private firms to be in a better position to access to resources, they registered as collective and state-owned enterprises through paying administration fees during the period between the middle 1980s and early 1990s. Thirdly, the central government formerly announced the policy of 'Zhuda fangxiao' meaning 'keeping the large and letting the small go' in 1995, which meant that there were resources available for private enterprises from public properties. Through the ownership transformation, state owned assets have been legally or illegally transferred to the private economy. For instance, the managers of state-owned firms could take bribes from non-state trade partners in selling state-owned assets by negotiating the contracts between the two parties (Tao and Zhu, 2000; 2001). Public properties also have been transformed into private assets by legally leasing but at a very low price (Yao, 2004). Small and medium sized state-owned and collectively-owned firms were allowed to lease to individuals since it was regarded as a means to improve the performance of the firms. The lease paid the collective a fixed rent and the residual from the operation went to the individuals. Asset accumulation by individuals through this method led to the share of collective ownership being reduced and transformed into private hands.

3.5 Financial sources available

Financial sources available to high-tech SMEs in the Chinese financial market are distinctive and different from those in other countries. This is mainly caused by the fact that governments at different levels have control over the banking system. The supports offered by the banking sector and the financial market to high-tech SMEs are very limited, which relates to the transformation of the banking sector from an extension of the national treasury to market-based commercial banks. Therefore it is worth starting with changes that have occurred to the banking sector and venture capital.

3.5.1 Venture Capital

In order for this study to examine venture capital available to high-tech SMEs, this section focuses on venture capital specialising in supporting the high-tech sector in China. Venture capital for the purposes of supporting new high-tech ventures emerged

in the middle of 1980s and developed over the past two decades. The venture capital industry was initially founded by the national government in the mid-1980s, most of the initial efforts in this field failed because of a lack of managerial expertises, regulations, and corruptions (Xiao, 2000; White et al. 2005). However, it developed rapidly in 1999 and 2000 as a result of the establishment of a legal framework to regulate venture capital firms. There are so far approximately 200 venture capital firms (VCFs) in China. They have been categorised into four groups in terms of their objectives and operation characteristics: government VCFs, corporate VCFs, university VCFs, and foreign VCFs (White et al., 2005). Government VCFs were operated and controlled by either the central or local government, in which initial funds were injected by governments. Indeed, they are increasingly dependent on listed and cash-rich firms to keep up their investment capacity. University VCFs started to emerge in 2000 from the key universities in China that have strong R&D bases, i.e. Tsinghua, Shanghai Jiaoda, Fudan. They benefit tremendously from their universities, giving them privileged access to new venture investment opportunities, as well as intimate information about the ventures.

However, Sood (2004) argued that the country's venture capital remains insignificant and has made little contribution to the growth of its high-tech sector. First, the venture capital system is less efficient than those in developed countries such as the US and European countries. The main reason is that there is a lack of experience and expertise in selecting, monitoring, and adding value to the venture in which they invest. Second, the objectives and incentives that government VCFs targeted were split between financial and social return to the investments. Investments might be influenced by political or social objectives. Third, university VCFs might be interested in only specific new technology firms that emerge from the university. In other words, the investment opportunities for university VCFs are limited in practice. It is worth noting that 'business angels' might be more important to provide funds to high-tech SMEs than VCFs, even though very few studies focus on this issue so far.

3.5.2 Bank Loans

It is necessary to begin with setting out the reform history of the Chinese banking system to understand its role in supporting SMEs in general and high-tech SMEs in

particular. The Chinese banking system that has been controlled by the Ministry of Finance over all financial services, credit and the money supply, had operated as an extension of the National Treasury to support state owned enterprises before the early 1980s. During the 1980s, the banking system was expanded and diversified to meet the needs of the reform in terms of the provided products and services. However, the banking system was still underdeveloped in terms of the efficiency of its operating system. The turning point was that the funds provided by the banking sector to state owned enterprises became bank loans from 'grants' without taking responsibility to the payments since 1980s. In 1995, China introduced the first central bank law and identified monetary policy aiming at maintaining currency stability. It gave the People's Bank of China the legal right to formulate and implement monetary policy, to control and supervise the financial system. Since then China tended to gradually transfer its banking system from the 'national treasury' to a commercial viable operation. Thus the Commercial Banking Law was also promulgated at the same time in 1995. The banking system was expected to turn in more profits to offset shortfalls in the central budget (the World Bank, 2000; Chow, 2002).

During the period of the banking system's reform, state owned banks held a large portfolio of non-performing loans that accounted for 25% in total of bank loans, 5-6% were considered not to recovered (the Chinese government and the People's Bank of China, 2002). Due to little interest in the private economy, state owned banks lost opportunities by not providing funds to private firms before the middle of 1990s. This can be supported by the fact that around 85% of bank loans were extended to state owned enterprises, less than 10% of loans went to non-state-owned firms in 1998 (Statistics Department of PBC, 1999). However, the private sector has been performing better in terms of employment, total sales turnover, and profitability since China's 'reform and opening' in 1978.

The further reform and restructuring of the banking system has been focused on reducing non-performing loans since the late 1990s. A policy introduced by the People's Bank of China known as 'responsibility to individual' was implemented by four state owned banks in 1997. This made credit officers personally responsible for loans, thereby discouraging them from making loans decision for both private enterprise and the majority of state owned enterprises. The banks started to become more risk

averse (Gregory and Tenev, 2001) and have little interest in sharing the potential rewards of projects that may be riskier but have a higher expected return. A question here is whether staff in local branches are able to assess loan applications based on credit system and judge the risk and return of projects. The assessment of a loan application relies on high value of collateral and personal relationship between the borrower and the lender rather than on project appraisal (Gregory and Tenev, 2001). According to the survey of 628 firms conducted by the IFC in 2000, the inability of firms to meet the collateral required by the banks was the most frequent reason for not being able to obtain bank loans.

The state owned banks tend to play a minor role in providing funds to private firms, not only for start-up capital but also for subsequent investment. Bank loans are not a major financial source used by private enterprises. There are much fewer financial intermediaries dealing with loan applications of SMEs (Nanto & Sinha, 2002). In addition, the funds provided by state owned and controlled banks varied between regions. The proportion of bank loans to private firms is larger than to state-owned enterprises in the more economically developed regions (Tam, 2004). For instance, the share of loans allocated to private firms was 56% and 65% respectively in 1999 and 2002 in Guangdong (Wang, 2004). In contrast, private enterprises in the Central and Western China received a much lower share of loans from financial intermediaries, compared with that in the Eastern coastal region (the World Bank, 2000).

3.5.3 Individual Financial Sources

Individual investors, in the form of both equity and loans, play an increasingly important role in supporting private enterprises, compared to formal financial intermediaries. On the one hand, a growing supply of privately owned finance exists. According to the World Bank (1994), China's savings rate averaged 37% of GDP between 1978 and 1995, although more conservative estimates placed it at 33-34%. There was more than RMB 14 trillion Yuan of household saving deposits at the end of 2005, which benefited from the growth of the China's economy (PBC, 2006). This shows that a large and increasing amount of private investment capital exists and is a valuable source of finance to high-tech SMEs, particularly in the coastal region. Furthermore, there are income gaps not only between rural and urban residents but also

between the Eastern coastal and the Western regions. Average incomes in urban areas are four times larger than in rural areas (the World Bank, 1997). A result of income inequality is that a small proportion of people own a large proportion of properties, which can be invested in the private sector. In fact, funds offered by informal investors become a major source to support both SMEs in general and high-tech SMEs (Wang, 2004). Individual investors who are usually introduced to the firms through the social network are likely to provide funds either in the provision of lending or equity.

On the other hand, there are pawnshops and private moneychangers which operate underground in urban and rural areas (Liu, 2001). Informal individual 'banks' provide loans at a higher level of interest rate to individuals or SMEs than state owned banks. Informal individual 'banks' are trustworthy in their commercial credit activities in the communities (the World Bank, 2000) where the private sector plays an important role in the local economy e.g. Wenzhou located in the coastal region. Private enterprises are likely to obtain loans from individuals rather than state owned and controlled banks, based on a survey of the financial condition of SMEs in China (Gao, 2000; Wang 2004). Funds provided by private 'banks' are also a major source for start-ups in China in recent years. In addition, individual 'banks' are operating more efficiently than state owned and controlled banks. Individual lenders expecting to make profits by lending to enterprises are more likely to focus on meeting specific requirements of SMEs e.g. frequent and seasonal demands for small amounts of finance (Tam, 2004). 'Business angels' might be growing, and provide sufficient funds to high-tech SMEs and SMEs in general, even though very few studies have been done in this field in China, as noted in previous section.

3.6 Public funds

It has been widely claimed that high-tech SMEs are a new engine of further growth and development of China's economy (the World Bank, 2002; Zhu Rongji, 2001). Governments at national, provincial and city levels have introduced a range of financial schemes and provided grants/loans to start and grow the high-tech sector, which is the same as in other countries. There are several schemes offered by government at different levels i.e. the Innovation Funds for Small Technology-based Firms and the

Torch Programme. These schemes aimed to either support new ventures or raise the level of R&D and innovation.

It is worth highlighting the Innovation Funds since it is considered the fairest to the applicants in term of the evaluation method (Yao, 2001). The scheme was established in 1999 and is managed by the Ministry of Science and Technology. The overall aim of the scheme is to support new technology-based small firms by providing merit-based free funds to technically advanced high-tech firms. The total amount of the funds is between RMB 500 million and 1 billion Yuan per year (Ministry of Science and Technology, 2001). By the end of November 2001, The Innovation Fund had provided about RMB 1.8 billion Yuan to high-tech SMEs. The average amount of funds for each project is RMB 745,000 Yuan. The start-ups that had been in existence for less than eighteen months accounted for 31% of successful applications; the rest (69%) were projects of R&D and intermediary testing. The allocation of the Innovation Funds concentrated on the information technology industry (30%), the bio-technology (18%) and the new-material industry (15%) (Annual Report of the Innovation Funds, 2002). In addition, a previous study has found that the Innovation Funds had positive effects on a recipient firm to attract more equity capital and bank loans, for instance in Sichuan (located in the Western region), it is estimated that every RMB 1Yuan received from the fund could attract RMB 5 Yuan from the market for the firm (Yang, 2001).

There is only a very small proportion of high-tech SMEs which successfully obtained a grant from the Innovation Funds, which is similar to the influences of the Smart scheme in the UK. In 2002, only 5% of high-tech enterprises registered received direct supports from the Innovation Funds scheme (Annual Report of Innovation Funds, 2002). High-tech SMEs in China can also receive a range of preferential treatments including tax reduction and priority to access land and building.

3.7 Conclusion

Drawing upon literature in the Chinese context, this chapter has shown that SMEs in general and high-tech SMEs in particular have been developed rapidly under a changing business environment in terms of the policies and regulations relating to the private economy and the financial market over the last 30 years. High-tech SMEs that initially

emerged in the middle 1980s mainly obtained initial capital from state-owned institutions e.g. state-owned research institute, university, and local government called supervisory agency. This type of high-tech SME has been developed rapidly depending on offering adaptive value-added products to the domestic market since not all companies were able to obtain a permission from the national government to supply these products. However, the way of starting and growing SMEs including high-tech SMEs has been altered since the late 1990s because of the changes in the institutional environment for small businesses. Funds from self-finance and retained earnings become major sources of finance used by SMEs in general and high-tech SMEs in particular. Bank finance is not a major source for high-tech SMEs, relating to the banking sector focusing on improvement of their own internal structure and preparation of listing on stock markets. Public venture capital has yet to become major sources for high-tech SMEs since it is still in the early stage of its development and aims to support the further reform of large state owned enterprises. The difficulties in accessing formal sources of finance are more severe for high-tech SMEs in China than for those in developed countries because of underdeveloped nature of the Chinese banking sector and the financial market. The distinctiveness is also that established SMEs in China continue to depend more on self-finance, retained earnings, and funds from informal investors than those in developed countries. Support from the national government is only available to firms with technology advantages. However, their efforts on supporting the high-tech sector as a whole are limited in terms of the number of firms successfully obtaining one.

Competitiveness of high-tech SMEs in China has been depending on cost reduction and their absorptive capability to either existing advanced technologies or existing technologies. Although high-tech SMEs have been successfully developed through reliance on the transferring technologies and focusing on the domestic market over the past two decades, this approach is likely to face challenges for their further growth and development in the market. In other words, the position for a long term success of the high-tech sector is likely to be weakened without developing original technology and achieving technology advantages. The availability of sufficient funds in particular medium and long term investment capital for R&D and innovation is thus crucial for high-tech SMEs to become technology-based ventures.

Chapter 4: Conceptual Framework

4.1 Introduction

The research aims/objectives were set out in the introductory chapter. The overall aim of this thesis is to investigate how high-tech SMEs in China meet their financial needs in relation to the different stages of their development. Looking at the aim, it is clear that the focus is on the relationship of high-tech SMEs and financial suppliers including banks, the venture capital market, and individual investors. The kind of relationship between high-tech SMEs and potential financial suppliers is crucial for firms to successfully obtain funds. How is the financial process conducted between high-tech SMEs and financial suppliers? What factors both at macro (i.e. national government) and micro (i.e. firms) levels structure and influence the transaction between high-tech firms and financial suppliers. What types of institutional arrangements are used to reduce the uncertainty of transactions and secure finance between high-tech SMEs and their suppliers? Thus the challenge for this thesis is to develop an understanding of the interaction between high-tech SMEs and financial institutions. The ideas and concepts associated with the field of institutional economics have been found to be particularly appropriate in helping to develop such an understanding and in interpreting the findings of the primary research that has been conducted.

The following section summarises the main features of institutional economics tradition from its origins to the school of new institutional economics (NIE). Section 3 focuses on institutional environment by distinguishing formal and informal institutions and their interaction. Section 4 then draws upon the concepts to produce a conceptual framework to help make sense of the relationship between high-tech SMEs and suppliers of finance.

A conceptual device of development stages is also developed in section 5 since it is fundamental to this study.

4.2 The main features of institutional economics

It is worth beginning with the earliest ‘institutionalisms’ since much of the work in new institutional economics draws inspiration from these. The earliest institutional views arose in Germany in the late 19th century and originated from the debate over scientific method. Then the earlier American institutionalists had the ideas that economics could be reduced to a set of universal laws or a genuine science. The historical school (led by Gustav Schmoller, 1900-1904) insisted that “economic processes operated within a social framework that was in turn shaped by a set of cultural and historical forces”. The scholars also called for economics to eschew its simplistic assumptions regarding ‘economic man’ and embrace more realistic models of human behaviours. Much of work drawn from the historical school was developed by American institutional economists, a number of them having received training in Germany in the mid-19th century. In the late 19th and early 20th century, Thorstein Veblen, John R. Commons, and Wesley C. Mitchell became quite influential. Although there were significant differences in their views, common themes were to criticise conventional economic models for their unrealistic assumptions and inattention to historical changes. This is because neoclassical economics as a conceptual framework has difficulties in explaining how economic relationships are structured.

Veblen (1898) criticised economic assumptions of individual behaviours within neoclassical theory. His argument against the theory was not that it was unrealistic but that it was inadequate as a theory to interpret economic behaviours. He broke the confines of equilibrium thinking and considered evolution and structural change. He attempted to analyse the process of change and transformation in the modern economy. He persisted in arguing that individual behaviours were guided by habit and convention. He (1919, p. 75) defined that “institutions are settled habits of thought common to the generality of man”. In Veblen’s work, the concept of habit plays a central role both in its definition of an institution, and in its picture of human agency. Indeed, these views had a preference for an ‘evolutionary’ rather than mechanistic approach to an economy (Scott, 1995). His work became the foundation for the now-popular genre of

‘evolutionary economics’. Although he was the founding father for an evolutionary alternative to mainstream economics, he never gave it systematic theoretical expression.

Commons (1862—1945) was an ‘old’ institutionalist whose work is especially close to the ‘new’ institutional economics (Hodgson, 2003). Commons (1924) introduced a concept of transaction that borrowed from legal analysis in his *Legal Foundations of Capitalism*. He claimed that “transaction is two or more wills giving, taking, persuading, coercing, defrauding, commanding, obeying, competing, governing in a world of scarcity, mechanisms and rules of conduct”. The ‘rules of conduct’ addressed in Commons’s work were social institutions. He attempted to provide institutional economics with a systematic theory that was not completed by Veblen. However, his attempts at theoretical construction were a failure since he did not produce an adequate alternative to the theory. Mitchell (1933) emphasised economic changes and insisted that economic principles should be grounded in facts as opposed to abstract, deductive theories.

The American institutional economists in the 20th century were more interested in solving practical problems, and an awareness of the role of change events and historical contingencies. Much of their work is suspicious of abstract, universal principles favoured by the German historical school and the homegrown philosophy of pragmatism. The new institutional economics that emerged in the 1970s attempted to modify their key assumptions to reflect real world situations more closely. The best-known representatives in the NIE are Coase, Williamson, and North. Most economists consider that the NIE originates from the work of Ronald Coase on the nature of the firm in 1931. The NIE is interested in the social, economic and political institutions that govern everyday life. It is now widely accepted as a body of theoretical concepts capable of providing an understanding of a wide array of institutions that influence economic behaviour and performance.

The NIE studies how institutions influence transaction and product costs and mainly focuses on how institutions govern human cooperation. In other words, the NIE studies the interaction between institutions and organisations through looking at the transaction costs of exchanges, which depend on the nature of the transaction, costs of monitoring and enforcement, the bargaining position, and the relationship between individuals and

groups. Thus it is an interdisciplinary perspective combining economics, law, organisation theory, political science, sociology and anthropology to understand the institutions of social, political and commercial life (Klein, 1999). The NIE intends to explain institutional changes and interaction of the formal and informal. It also traces out the unintended consequences in terms of human interaction (Hodgson, 1998) through rational individual behaviour. The NIE directs attention to the critical relationship between the rules of the game that constrain human activity and the process of economic development.

The literature in the NIE is expanding rapidly and gaining increasing numbers of adherents and influence in a wide range of fields. The NIE has already contributed to the development of contract theory, political economy, law and economics, regulation theory, corporate governance, and other areas in applied economic theory. As a theoretical framework, it helps to provide a deeper understanding of the interaction between institutions and the responses of organizations. Furthermore, as a theoretical framework approach, it is universal in application. For instance, it can apply not only to mature market system but also to transitional economies.

4.3 The institutional environment

The institutional environment including both formal and informal institutions forms the framework in which human action takes place. There are several definitions of an institution to be found in the literature. North (1990, p. 4) defined that institutions are “any form of constraint that human beings devise to shape human interaction”. The core of the institution in a society is to reduce the uncertainty by establishing a stable structure to human interaction. North (1990) also portrays organisations as being players in the game; institutions are referred to as rules of the game. Organisations comprise political bodies (political parties, the Senate, a city council, a regulatory agency), economic bodies (firms, trade unions, family farms, cooperatives), social bodies (churches, clubs, athletic associations), and educational bodies (schools, universities, vocational training centres) (North, 1990). North’s definition of an institution is broad and includes inter and intra-organisational transacting, legal and regulatory work, and cultural, social and cognitive processes which provide a norm structure to guide interaction (Redmond, 2005).

Williamson (1985) defined that institutions, as mechanisms, govern transactions and minimise transaction costs. Williamson differentiated three levels of social analysis namely the top, the macro, and the micro. The top level is the social embedded level including norms, customs, and traditions. Within this level religion plays a crucial role in some societies and changes slowly. The macro level is referred to as the institutional environment and comprises a set of political, social, and legal ground rules. Institutions at this level are designed by authorities (i.e. national government) and establish the basis for production, exchange and distribution. However, rulers and regulators might not take into account the interests of all parties since some parties with bargaining power may have priority in the formation of formal rules. The macro institutions emerge spontaneously in response to changes in political and economic conditions. Changes in political and economic conditions create new opportunities for human interactions. The micro level is a set of institutional arrangements between economic agents or firms that governs economic exchanges between firms or individuals. This level is located in the institutions of governance; therefore the governance of contractual relations becomes the focus of analysis.

Hodgson (2001) defined that institutions serve to constrain and guide human behaviours. More particularly, institutions are systems of established and embedded social rules that structure social interaction. Institutional constraints include both what individuals are prohibited from doing and, sometimes, under what conditions some individuals are permitted to undertake certain activities. In his work, Hodgson emphasised habits and routines within informal institutions since they are crucial to guide business activities. Habits and routines have considerable effects on the enforcement of formal rules in practice once they are established. Habits are regarded as rational actions that are repeated. Routines are not simply actions that have become congealed (according to Hodgson, 2003), as in addition they both enable and mould future actions.

4.3.1 Formal and informal institutions

Formal institutions

Formal institutions can be categorised into macro and micro levels. Formal institutions at macro level are constitutions, statutes, common law, and other government regulations that are designed by authorities. They determine the political system (i.e., the governance structure and individual rights), economic system (i.e. property rights and contracts), and the enforcement system (i.e. the judiciary and police). Formal institutions at micro level are contractual arrangements that are designed and used to govern economic exchanges between firms and individuals. Of these sets of rules, the legal environment and property rights have received the most attention by economists. Formal institutions play a central role to facilitate and govern human interactions within economic exchanges since the rules of formal institutions are supposed to be legally enforceable by a third-party judicial body. In addition, the institutions at macro level have significant effects on contractual arrangements since the macro established the basis of economic systems.

Informal institutions

Informal institutions are also important in shaping human action in economic activities. North (1990) defined that informal constraints are typically unwritten codes such as customs, conventions, and traditions everybody follows. Schotter (1981) defined: “informal institutions are regularity in social behaviour that is agreed to by members of society, specifies behaviour in specific recurrent situation and self-policed by some external authority”. Hodgson (1996) emphasised habits, routines, and institutions in his work. Habits and routines are formed by repeating thought and behaviours as well as learning processes and are influenced by prior activities. Habits and routines therefore have durable, self-sustaining qualities (Hodgson, 2000). A common theme of the three definitions above is that informal constraints are traditions, customs, moral values, and religious beliefs that are maintained from one generation to another through various methods such as teaching and imitation. The enforcement of informal rules is controlled by means of sanctions i.e. expulsion from the community, isolation by friends or neighbours, or loss of reputation. Informal constraints are also habits and routines that

are formed by repeating the application of thought and behaviours. Informal constraints are used more to guide business activities between firms or individuals in situations i.e. transitional economies where either there is a lack of formal institutions or they are difficult to enforce.

4.3.2 Changes of formal and informal institutions

North (1990) claimed that understanding institutional changes entails an understanding of the stable characteristics of institutions and the sources, the agents, and the direction of the change. Institutional changes are a complicated process, which differ from the forces that cause the changes. For instance, political and economic systems (war and economic transition) lead to fundamental changes in both formal and informal institutions. In contrast, functional adjustment of institutions leads to incremental changes in both formal and informal institutions. The results of economic growth are influential factors to produce changes in formal and informal institutions since new opportunities become created alongside with economic growth. In order to exploit the potential opportunities, it is necessary to change formal and informal rules. The following section examines institutional changes in transitional economies.

The reasons for institutional changes vary according to economic systems. In a mature market system, institutional changes result from political arrangements, structures of property rights, technologies employed, physical qualities of resources, commodities, and services that are exchanged (Eggertsson, 1990). What causes institutional changes in transitional economies? In a transitional economy, a demand for a market-based system that comes from both authority and private economy/population is the main force to either fundamentally alter or build up both formal and informal institutions. The changes in formal rules may come about as a result of changes in legislation and constitutions. A demand for functional improvement is another reason to incrementally alter formal rules. An institution demands changes in a situation where alternative institutional arrangements provide a better deal. Existing formal constraints may also be replaced by a new rule to meet a certain group who are in better position. The effects of an institution on the development process are often contradictory and dynamic. It can be stimulating in one phase but inhibiting in another or positive in one respect but negative in others. Formal institutions sometimes provide a stimulating environment for a certain

type of company in one phase but can at the same time be inhibiting for other companies in other development phases. For instance, deregulation of a certain trade creates the establishment of new companies within that trade but may impede existing companies through fostering greater competition, leading to falling prices, and falling profits.

During a period of economic transition, the institutional environments for business development are unstable and less certain. There is a lack of formal institutions that can satisfy the needs of a market-based system and be enforced properly within economic activities. There is thus a need for establishing the formal institutions that fit into a market-based system to guide economic exchanges. However, 'importing institutions' from developed countries may not be a good idea to produce the expected consequences because there are significant differences in informal institutions between developed and less developed countries. A gradual transformation of China's economy has been designed by the central government, and has been implemented over the past three decades. It is apparent that formal institutions have been changed rapidly and frequently, which cover business activities, social welfare, and job security. An inconsistent change between formal and informal institutions emerges since informal constraints embodied in customs, traditions and codes of conduct are much more impervious to deliberate policies (North, 1990). Under a varying institutional environment, formal arrangements are difficult to enforce as they lack a continuing function. Thus it is hard to be recognised in a business society. In addition, a disparity emerges between what is intended to occur according to formal rules and what actually happens in practice because of the influence of informal rules on business activities. This conflict leads to existing formal rules being ignored or less enforceable in governing economic exchanges.

Informal constraints therefore play a more important role in regulating economic exchanges than formal rules in transitional economies. Firms rely more on informal rules to get away from formal constraints that impede their development and growth. Informal institutions therefore have considerable influence over the behaviours of individual managers, their firms, and the generation of new formal constraints (Peng and Heath, 1996). In addition, contractual arrangements are negotiated by economic agents or individuals based on the condition in which transactions take place. Informal

contractual arrangements can be more important than formal arrangements in some cases in which the informal are more useful to induce cooperative behaviour and minimise problems of transaction in a transitional situation. Due to the nature of less power of informal institutions in terms of penalties in resolving disputes than formal rules in economic activities, a combination of formal and informal institutions becomes more crucial to govern economic exchanges than either the formal or informal. Furthermore, heavy dependence on the informal conditions leads entrepreneurs to be reluctant to invest in medium and long term projects until a stable formal institutional environment is established.

4.3.3 Interaction between formal and informal institutions

There are interactions between formal and informal institutions which are characterised by evolution, breakdown, and replacement from each other (Hodgson, 1996). New institutional creations can be consequences of interaction between formal and informal institutions. This is because individual behaviours are influenced by not only the formal but also habits and routines in business activities. The following sections explore how formal and informal institutions interplay.

If formal rules are problematic in practice, then these may motivate the erection or development of informal institutions and rules. If there is a lack of formal institutions, this can lead to informal rules being developed or improved to guide economic activities. In addition, if a new formal rule is put into practice, this may lead to a new habit or routine being formed by repeated application in practice. Changes of formal institutions can cause adjustment and changes in habits and routines of thought and behaviours. Formal institutions can develop and direct formation of new habits and conventions of thought and behaviours. For instance, a formal rule that has given formal recognition to private firms in China since 1999 had made changes in informal rules on individual attitudes towards legal position of private firms. As a result, more and more well educated personnel with valuable working experiences are willing to establish their own private firms. It can be concluded that changes of formal institutions give rise to new perceptions and dispositions within individuals.

If informal rules gain credence over time, economic agents may become motivated to formalise them through amending the contractual arrangements. For instance, a successful informal rule to govern finance between private firms and individual suppliers can be absorbed by the banks as a formal institution. In this case, an informal rule, such as 'customary law', may evolve into a formal rule. In other words, a formal institution may originate from an informal institution when it has satisfied needs in practice. Individual suppliers may be formalised by giving a formal recognition in terms of a legal position. If economic exchanges that are guided by informal rules develop rapidly, government may formalise these informal arrangements by establishing formal rules. If informal rules that govern economic exchanges have become more influential, this can be a force to formalise by setting up contractual arrangements. For instance, when cooperation between experts and owners of high-tech SMEs to conduct R&D that is governed by informal rules becomes successful in the market, formal contractual arrangements may be crucial to guide further teamwork. Finally, adjustment or creation of formal rules would consider informal constraints since these have effects on the consequences of enforcement. For instance, similar formal rules in state and private owned firms in China have produced different consequences since the informal conditions in state owned enterprises have failed to be changed at least in the beginning of the introduction of new formal rules.

4.3.4 Intellectual property rights

The concept of intellectual property is to treat certain intangible products similarly to physical things. The holder of an intellectual property is granted certain kinds of exclusive rights over these intangibles using the analogy of physical property rights, some expiring after a set period of time, and others lasting indefinitely. Therefore it is useful to briefly outline the definition of property rights. There are three key aspects. Firstly, there is the right to use an asset. The potential uses of an asset are legitimate for an individual, including the right to transform physically or even destroy an asset. Secondly, there is the right to make income from an asset and contracts with other individuals. Thirdly, there is the right to transfer permanently to another party ownership rights over an asset, which is to alienate or sell an asset (Eggertsson, 1990). However, there are different characteristics between intellectual and tangible property in economic theory. Tangible property is characterised by consumption. For instance, if

one person uses a plot of land to build a home, that plot is unavailable for use by others. However, intellectual property does not share this feature. For instance, an indefinite number of copies can be made of a copyrighted software package without interfering with the use of the software by owners of other copies.

Intellectual property rights are part of the NIE, as they shape and guide exchange and transaction, and resolve disputes between individuals or firms. Intellectual property is generally divided into four groups namely: copyrights, patents, trademarks, trade secrets. It is worth emphasising here that a patent holder has an exclusive right to prevent third parties from commercially exploiting an invention for a certain period, typically 20 years from filing date of a patent application. A patent can be used to prevent that second person from making the same design even if they had never heard of or seen the original. Patent rights thus are more powerful and harder to obtain and more expensive to enforce. The beneficiaries of patent protection have an incentive to promote innovation by ensuring that someone could recoup his/her investment of time and energy. Due to patents being treated as physical property, theoretically a patent can be accepted by banks as collateral to secure a loan.

4.4 Conceptual framework

As discussed above, any economic transactions between individuals and/or firms are guided by formal and/or informal contractual arrangements. During a period of economic transition, informal arrangements are more important to shape the economic exchange since there is a lack of formal or functioning rules. The relationship between high-tech SMEs and their financial suppliers are strongly influenced by what set of formal and informal contractual arrangements are adopted. Thus the ideas and concepts drawn from the institutional economics offer a suitable interpretative frame to this thesis. It emphasises the influence of adopting formal and informal contractual arrangements on the financial processes conducted between high-tech SMEs and their suppliers.

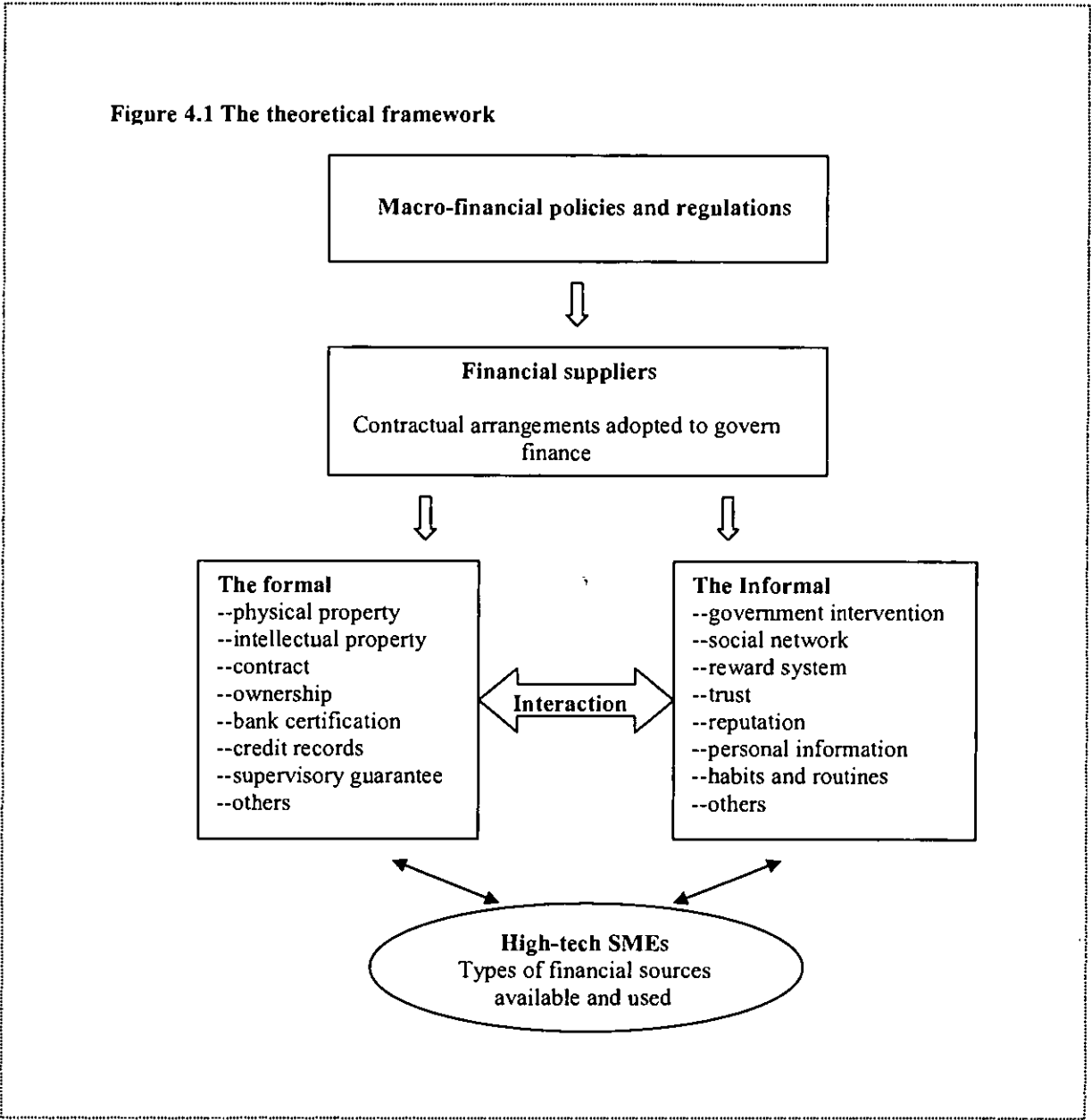
Figure 4.1 shows how formal and informal contractual arrangements influence the types of financial sources available and actually used, in that the starting point is with macro-financial policies and regulations. Firstly, the framework shows that macro-financial policies and regulations form the basis of the financial environment. Secondly, the

financial environment influences financial suppliers on selecting a set of the formal and informal conditions that are applied to guide a transaction between high-tech SMEs and financial suppliers. Thirdly, the framework outlines the types of both the formal and informal. Formal arrangements include ownership structure, physical property, intellectual property, contract, bank certification, credit record, and others. Informal arrangements comprise government intervention, social network, reward system, reputation, personal information, and others. Most importantly, the relationship between financial suppliers and high-tech SMEs is influenced by adopting a set of formal and informal contractual arrangements.

It is necessary to explain two of these informal contractual arrangements namely: government intervention and social network, which were distinctive in a transitional economy, particularly in China. Government intervention here addresses the involvement of different levels of government in loan decision making, which frequently happened before the late 1990s. For instance, state owned firms that had been making losses and owed a large amount of bank loans and interest payments had further financial needs to cover the workers' salaries. In order for state owned enterprises to continuously obtain bank loans for paying the wages, they asked government officials to intervene. The main concern to the government was that an unstable society could result from the delays in or non-payment of wages. From the financial intermediaries' perspective, bank managers haven't intensively taken responsibility for their profits and losses in practice until the late 1990s. As a consequence, bank managers were willing to provide funds to these firms since government asked them to do this. In the cases, the banks were treated as a body to resolve political issues rather than business matters, although they were supposed to be commercial banks.

The other informal arrangement, social networks emphasise the importance of relationship to loan decision making before the late 1990s. The social network includes a group of people who had friendship with both the firms and the banks or who were quite influential in the community. The 'trust' between the firms and the banks was built up based on supporting each other through friendship. Therefore the bank managers might ignore issues of financial security and were more interested in providing support for individuals they knew. Firms that employed a social network to

access bank loans were prepared to accept an increased cost, but some might not enable to make the loan repayments in practice.



The conceptual framework presented in Figure 4.1 shows that the combinations of formal and informal arrangements adopted can influence the ability of high-tech SMEs to meet requirements of banks. In other words, the combination adopted influences the relationship between high-tech SMEs and financial suppliers. It is interesting here to explore what factors impact on selecting formal and informal contractual arrangements.

Firstly, the combination adopted is influenced by formal arrangements available and the interaction between formal and informal arrangements, as noted in the previous section. Secondly, the combination adopted varies with different financial suppliers. The differences of selecting formal and informal arrangements between individual suppliers and the banking sector are: the individuals are more likely to negotiate contractual arrangements available with each firm, but the banking sector would rely on financial policies and regulations introduced by the central government.

The following section applies the conceptual framework to interpreting the relationship between the banking sector and enterprises along with the development of the banking system. Support from the banking sector to enterprises varied depending on formal and informal contractual arrangements used by staff responding to macro-financial policies and regulations introduced by the national government. The development of the banking system can be separated into three phases, as shown in Table 4.1.

Table 4.1 The contractual arrangements adopted by the banks according to three phases

Three phases	The nature of the banks	The contractual arrangement			
		The Formal	The informal	Relationship	
Prior to the early 1980s	An extension of the National Treasury	Ownership structure (state owned firms)	Relationship with the banks	Supporting state owned firms	
Between the early 1980s and late 1990s	State owned commercial banks	-Ownership structure -Physical property -Proposal -Contract -Bank's certification -Supervisory guarantee	-Government intervention -Social network -Reward system	Providing funds to both state owned and private firms	
After the late 1990s	Preparing to list on stock market	Physical property	None	Being over cautious to provide funds	

Phase 1: prior to the early 1980s

The banking sector was simply operationalized as an extension of the National Treasury in serving state owned enterprises in which loan decision making was guided by the

planned economy, as recognised in Chapter 3. It appears that the ownership structure was the only criteria to offer bank finance to state owned enterprises. Staff in local branches who were responsible for loan decision making did not need to assess the risk and return of the projects. They never considered security and repayment of bank finance, and never considered supporting privately owned enterprises until phase 2.

Phase 2: between the early 1980s and late 1990s

The sign of phase 2 was that the banking sector was asked by the national government to diversify their services and support the growth and development of the Chinese economy. It has been transformed from the extension of the National Treasury to a commercial banking system by 1995. Staff in local branches were allowed and encouraged to use flexible contractual arrangements to assess loan applications and make loan decisions. These mainly comprised formal arrangements i.e. ownership structure, physical property, contract signed by creditable customers, and bank certification and informal arrangements i.e. social network, government intervention, extra benefits to staff, and supervisory guarantee. Actually, informal arrangements were more important to influence loan decision making than formal arrangements at that time. Due to not taking responsibility on funds security, staff in local branches might not consider risk and return of project in practice, and provide funds to enterprises that they were interested in. For example, some bank managers/credit officers helped enterprises to meet the requirements of the banks by producing illegal documents for their loan applications. As a consequence, both state-owned and privately owned enterprises benefited from the changes in selecting contractual arrangements, and obtained funds from the banking sector. However, a large amount of non-performance loans has been created by the banks at the same time, contributing to a serious barrier for the further transformation of the banking system.

Phase 3: after the late 1990s

This phase is characterised by the further transformation of the banking system from state owned to public owned commercial banks. The banking system has been asked to reduce the non-performance loans and prepare to list on overseas or domestic stock exchange markets. A policy known as 'responsibility to individual' has thus been

introduced and implemented in the banking sector since 1997, as noted in Chapter 3. This first made staff personally responsible for loans. The responses of staff to this policy were that they have become reluctant to provide funds to enterprises by changing a wide range of arrangements to a high value of collateral, which has led to firms having difficulties in meeting the requirements. Therefore, a poor relationship between enterprises and the banking system has been created.

The discussion above suggests that both formal and informal arrangements used by staff in local branches influenced the availability of bank finance to enterprises. Support from the banking system to enterprises varied according to the macro-financial policies and regulations introduced by the national government, which made a greater support to firms in phase 2 than phases 1 and 3. Under the changing institutional environment, informal arrangements i.e. attitudes and habits of bank managers/credit officers had important effects on enforcement of formal institutions. Due to the nature of state owned banking sector, its development and transformation have been driven by the central plan rather than the market force, and its effort on supporting enterprises has been strongly influenced by the culture of state-owned organisations. The attitudes and habits of staff towards serving firms have been influencing availability of bank loans to firms. It appears that a higher value of collateral required, less support provided to firms. Therefore, it can be concluded that informal arrangements have played an important role in providing bank finance to firms during the period of economic transition.

4.5 The conceptual device of development stages

The overall research question of this thesis is how high-tech SMEs in China meet their financial needs in relation to different stages of business development, as stated in Chapter 1. Firms at different stages of development are placed in changing positions in relation to sources of external finance. Thus, the use of a model or a conceptual device of development stages is necessary to distinguish high-tech SMEs at the various stages of their development. Therefore, this study produces a model of development stages prior to undertaking the fieldwork in order to ensure consistency in the way business survey was conducted and surveyed firms were classified.

It is difficult to define and measure discrete stages of a firm's development in practice since the stages can merge and overlap. A number of models have been proposed by previous authors in an effort to explore development stages of businesses. There are differences in the number of stages proposed and dimensions used to describe specific stages. Most models of business growth suggest a fairly common pattern including start-up, growth, and maturity stages (Churchill and Lewis, 1983; Miller and Friesen, 1984). Some studies (Moore, 1993) that focused on high-tech firms divided start-up into two distinct stages, the first centring on R&D and prototype development activities, the second focusing on commercialisation of products. The model that focused on high-tech firms therefore separates business growth into four stages namely: conception and development, commercialisation, growth, and maturity. However, it has been argued that most models noted above are conceptually rather than empirically based (Hanks, 1994; McMahon, 1998). Practically, it might not be necessary for a firm to pass through all development stages. For instance, technology-oriented founders might have developed products or even contacted potential customers before the firms established formally.

According to Deakins and Freel (2003), a start-up stage high-tech firm usually focuses on exploiting technology, recognising technology-related opportunities, and dealing with potential customers, suppliers, and bank managers. Moore (1993, p.115) distinguished three types of high-tech companies at the start up phase:

- “1) companies developing products or requiring high front-end development costs;*
- 2) companies where lead times from concept to market launch are short, front-end development costs are low and as a consequence cash flow generation occurs relatively early in the company life cycle;*
- 3) companies where market entry and product development occurs over an extended period of time often through consultancy, or contract R&D in niche markets”.*

According to Mayer (2002), an early stage high-tech firm normally generates sales turnover, expands, and develops its customer base but remains unprofitable, whereas a later stage firm usually generates significant annual revenue and keeps on making considerable profits for several years. A later stage firm has an established place in the market and loyal customers. Growth of sales turnover is not necessarily explosive but manageable. However, exceptionally it is possible to make a loss during a later stage of

development. For instance, a dip in sales or a large amount of investment in developing new products could lead to no profits being made for one or more years.

Previous empirical studies that were focused on sources and types of finance, usually either adopted the age of firms as a measure of the development stages or did not define discrete stages but instead collected information at selected points in time. For instance, a previous study focusing on the financing of ethnic minority SMEs in the UK looked at firms at two points in time, at start-up stage and then during the 12 months prior to the interview (Ram et al., 2002). This study did not distinguish financing of firms between different development stages. Another empirical study concerned with the financing of high-tech SMEs in European countries, identified development stages by the age of firms (Klofsten, 2000). The problem with this measurement is that there can be significant variations in business growth between firms of a similar age. The firms in a given age group might not be consistent with each other in terms of development stages. For instance, during the first 5 years of their existence some firms might remain at the stage of developing products and services; while others might achieve significant sales growth and profit making. In other words, the problem within the study is that firms of a similar age could be in a different position to access external finance in terms of their ability to provide collateral and their business reputation. Thus identifying development stages on the basis of age might not be able to ensure consistency.

To overcome these problems associated with previous definitions and measurements of the stages of business development, this thesis adopts a fresh perspective. Three stages of business development are defined by firstly drawing ideas and concepts from common measurements i.e. sales turnover generation and profitability. Secondly, these ideas and concepts are then applied and implemented during the face to face interviews. Thirdly, interviewed owners/senior managers are asked to identify the development stages relevant to their businesses during the surveys. The key contribution of the conceptual device is to ensure consistency in the interpretation of the three stage model in relation to different sources of external finance. The model enables this study to identify stages by basing them on empirical evidence from the interviews with owners/senior managers who are best able to position their business in relation to three stages. Moreover, it avoids over-emphasised measurement indicators e.g. sales turnover, profitability, stable revenues that may not be realistic, resulting in a misleading

definition. The definition of three stages of development for the purpose of this research is as follows:

1) Start-up (Chuangban jieduan): as a time when firms have just registered and their products/services are being developed and initial customers are validated. They would normally not be trading and therefore not make a profit. But it is possible for specific firms to be profitable in the start-up stage as for example, where owners have engaged contracts prior to registration of their firms.

2) Early stage (Tou ru jinying jieduan): firms are producing products/services for early customers but would normally be unprofitable. It also includes specific early stage firms that are profitable as for instance, owners build up a good relationship with their customers prior to their establishment, and have low front-end development costs.

3) Later stage (Zhenzhang fazhan jieduan): firms normally have significant revenue growth and have generated profits for several years. However, it is possible for some later stage firms to temporarily dip into unprofitability as for instance, where firms invest a large size of investment capital in either fixed assets or R&D in their later stage of development.

4.6 Conclusion

Concepts from new institutional economics, particularly those relating to formal and informal institutions and their interaction, have been used to develop a conceptual framework for the purpose of this study. The conceptual framework discusses rapid changes in the institutional environment, inconsistent changes between formal and informal institutions, and the consequence of conflicts between them. The starting point in this framework is macro-policies and regulations introduced by the national government relating to the reforms of the banking system. Then a set of combined formal and informal contractual arrangements responding to the macro-institutional environments were used by financial suppliers to secure their investment capital. The combination of formal and informal constraints is influenced by the institutional environment and varied with financial suppliers. A particular interest for this study is

that the way of selecting formal and informal arrangements leads to relationship between high-tech SME and financial suppliers.

This chapter has also developed the conceptual device of development stages. It first defines three development stages of business growth namely: start-up, early, and later stage. Then the definition is applied to the face to face interviews. Finally, interviewed owners or senior managers then identify development stages relevant to their businesses according to the definition. By developing the conceptual device, this study ensures consistency in the interpretation of the model. The next chapter discusses the research methodology and methods used in the study.

Chapter 5: Research Methodology

5.1 Introduction

The research aims/objectives in this study have been set out in Chapter 1. The overall research aim is to investigate the financial needs of high-tech SMEs in China in relation to different stages of their development. To investigate this research issue, the conceptual framework has been developed in Chapter 4, which allows for a deeper understanding of how formal and informal institutional arrangements guide transactions between high-tech SMEs and financial suppliers in China. This chapter is concerned with discussing the methodological issues involved in addressing the research questions and establishing ways in which the concepts drawn from institutional economics are to be operationalised in the primary research conducted for the purpose of this study.

Section 2 states research questions based on the research aims/objectives and theoretical issues identified in Chapters 1 and 4 respectively. Section 3 discusses the consideration of methodological choices. Section 4 presents the research design including the selection of the sample and sampling methods. Section 5 presents the process of conducting the empirical surveys and Section 6 assesses the validity of the research findings.

5.2 Statement of research questions

As stated previously, distinguishing financing of high-tech SMEs in China through the three stages of business development is the main focus of this study, which addresses what sources of finance are actually sought and used by high-tech SMEs. As indicated

in Chapter 3, China's economy has been transforming over the past three decades, and there are variations in the speed and extent of transformation between sectors. For instance, the transformation of the banking sector has been much slower than that of private enterprises. Therefore, it is crucial to identify whether the reform of the banking system has led to bank finance being a major source to high-tech SMEs. It is also important to look at the extent to which funds from private sources have become major sources of finance to high-tech SMEs because of China's 'reform and opening'. Moreover, financial support provided by governments at national and provincial levels could be one of the major sources available to high-tech SMEs, as indicated in Chapters 2 and 3. The research will therefore focus on the following three research questions:

- 1) What are the specific sources of finance actually sought and used by high-tech SMEs in relation to various stages of their development?
- 2) To what extent does the current relationship between the demand for and supply of finance for high-tech SMEs indicate deficiencies in the current Chinese financial market?
- 3) What is the current role of government in relation to high-tech SMEs? To what extent does the range of financial support provided by governments at different levels meet the financial needs of high-tech SMEs, especially for the start-ups and R&D and innovation spending?

5.3 Consideration of methodological choices

Social and business researchers normally adopt one of two methodological approaches: positivism and phenomenology. Positivist methodology is characterised by adopting a clear quantitative approach and is based on deductive thinking. This approach is favoured in studies aiming to produce generalising conclusions and making inferences from sample findings to the population. It seeks to measure key concepts and test hypotheses, and relationships between two or more concepts asserted in the theory (Curran and Blackburn, 2001). The use of surveys is normally associated with a positivist methodology. This approach is thus particularly useful for studies concerned with testing theories and hypotheses against survey data. Previous empirical studies focused on financing SMEs in general and high-tech SMEs in particular in developed

countries such as the UK and the US have usually employed a quantitative approach. The empirical results i.e. a financial gap and financial constraints facing SMEs were then generalised according to the survey evidence, contributing to the body of knowledge in financing of SMEs. However, the considerable weakness of this approach is its limitation in achieving a complete understanding of research findings, particularly from individual perspectives.

The phenomenological approach is characterised by adopting a qualitative approach and is based on an inductive thinking in which the theory is the outcome of processes of thinking and observation. The attraction of this approach lies in its ability to generate extensive, rich and detailed data since it enables researchers to conduct case study and collect comprehensive information from a wide range of perspectives within a company. This approach thus yields a rich understanding of key issues which actually affect and may even determine the small firms' potential for their growth (Hill and McGowan, 1999). However, this approach is unlikely to produce representative conclusions and make claims to the population as it usually only involves a small number of cases. In fact, each of these methodological choices has its own strengths and weaknesses in real world research. Therefore, a mixed quantitative and qualitative approach can gain advantages and avoid weaknesses of both approaches, as Curran & Blackburn (2001) noted.

The nature of the research aims/objectives and questions is a key influential factor in the selection of an appropriate methodology for social and business researches. The main concern with this study is to investigate what financial sources are actually sought and used by high-tech SMEs in relation to various stages of their development. The availability of each source of finance to high-tech SMEs needs to be generalised according to the key concepts i.e. frequencies of firms actually obtaining and using each source and the proportion of each source in total invested capital. From a policy perspective, constructing a quantitative picture as to whether high-tech firms have financial constraints especially for the start-ups and R&D and innovation expenditure is needed to consider financial support and other relevant issues. Furthermore, making the comparisons of accessing financial sources between the geographical areas needs a quantitative approach. For these reasons, this study therefore adopts a positivist methodology in which surveys are the most appropriate method of primary data

collection. In addition, due to limited secondary data available from academic studies, government reports, and official statistics in China, the choice of a survey method becomes particularly important.

The survey approach in this study aims to collect not only quantitative but also qualitative data. The key point for the collection of both quantitative and qualitative data is to gain the advantages and avoid the weaknesses of both approaches. Quantitative data collected enables this study to produce generalising conclusions, to make inferences from the sample findings to high-tech SMEs as a whole in China, and to address the gap in knowledge of the literature. The research findings will be especially useful to audiences i.e. business owners, financial intermediaries, policymakers. The more qualitative data collected helps in the interpretation of the research findings. The qualitative information provided by interviewees from different perspectives i.e. from business owners/senior managers, bank managers, and government officials, makes it possible to produce a fuller understanding of financial issues in high-tech SMEs.

5.4 Research design

Having put forward the reasons for adopting a survey approach, this section describes the design of the various surveys used in this research. Firstly, this section discusses stratification through the selection of study provinces and sectors, which attempts to ensure a representative sample from the population. Two contrasting provinces and two study sectors, namely Guangdong and Guangxi, electronic and information technology (EIT) and biotechnology (bio-tech) were selected in this study. Secondly, it defines a high-tech SME for the specific purposes of this research. Finally, the sampling methods employed in this thesis are discussed.

5.4.1 Selection of study provinces

Two contrasting provinces, namely Guangdong and Guangxi, located in the coastal and western provinces were selected for this study. On the one hand, they are representative of developed and less developed provinces in China respectively. On the other hand, they might reflect different phases of China's reform and opening since 1978 in terms of the level of development of a market-based system. It has been increasingly recognised

that the private economy has been developing rapidly over the last 30 years, which also dominates the growth and development of regional economies. However, inequities of economic growth and development as well as personal wealth generated have emerged and been growing between the coastal and western regions. This might suggest that the high-tech SMEs located in the two study provinces are at different levels of development. It might therefore lead to different financial strategies being adopted by the firms in the two study provinces since the sources of finance available may be different. The research will enable some comparison between high-tech SMEs in both the developed and less developed regions in China.

Table 5.1 shows differences in the level of economic development between the two study provinces by presenting industrial structure, output of major industrial products, import and export value of commodities, and actually used foreign direct investment (FDI) during the period from 2001 to 2003. The table reveals significant differences in the industrial structure between the two study provinces. For instance, secondary industry (manufacturing) in Guangdong accounted for 50.2% of the total GDP, compared to 35.5% in Guangxi. Guangdong focused on household electrical appliances and micro-computers and was a leading producer of these products in China. A considerable proportion in total household electrical appliances was exported to international markets. Guangdong has ranked first amongst Chinese provinces in terms of its GDP, import and export value, and actually used FDI in recent years. The amount of FDI used in Guangdong is much larger than that in Guangxi, which implies that enterprises in Guangdong are more involved in international markets than those in Guangxi. In contrast, Guangxi is one of the biggest agricultural provinces with top producers of sugar, meat, fruit, tea and aquatic products in China. However, these sectors are less profitable and generate lower added value than the sectors that predominate in Guangdong.

The main economic indicators in the two provinces between 2001 and 2003 are presented in Table 5.2. The table reveals a considerable gap in per capita total income, disposable income, average money wage, and GDP between the two provinces. Tables 5.1 and 5.2 suggest that the inequity in economic growth and development exists between Guangxi and Guangdong according to the economic structure and main economic indicators. It implies that the amounts of funds available to support the

provincial economy in Guangdong were larger than that in Guangxi. In other words, firms in Guangxi may face more difficulties in obtaining funds to finance their development than those in Guangdong because of different levels of economic development.

Table 5.1 Economic structure by province in 2001, 2002, and 2003

Economic structure		2001		2002		2003	
		Guangdong	Guangxi	Guangdong	Guangxi	Guangdong	Guangxi
Composition of output (%)	Primary industry	9.4	25.2	8.8	24.3	8.0	23.8
	Secondary industry	50.2	35.5	50.4	35.2	53.6	36.9
	Tertiary industry	40.4	39.3	40.8	40.5	38.4	39.3
Output of major industrial products	Chemical fibre (10,000 ton)	47.82	2.42	44.78	2.38	46.54	1.36
	Sugar (10,000 ton)	83.25	274.51	113.11	480.03	3.49	115.07
	Household electrical equipment (10,000 units)	2805.86	0.16	3596.49	1.57	5466.05	2.62
	Micro-computers (10,000 units)	228.70	0.72	415.69	0.13	881.05	0.01
Import and export value of commodities (US \$10,000)	Total	18,000,229	208,202	22,545,138	260,694	28,922,994	322,168
	Export	9,582,860	135,109	11,909,156	147,665	15,370,992	177,705
	Import	8,418,454	730,99	10,635,982	113,029	13,552,002	144,463
Actually used FDI (US \$10,000)	Foreign direct investment	1,193,203	38,416	1,133,400	41,726	782,294	41,856
	Foreign other investment	170,263	0	197,732	0	227,041	0

Source: China Statistical Yearbook in 2002, 2003, and 2004

Table 5.2 Main economic indicators by province in 2001, 2002, and 2003 (RMB Yuan)

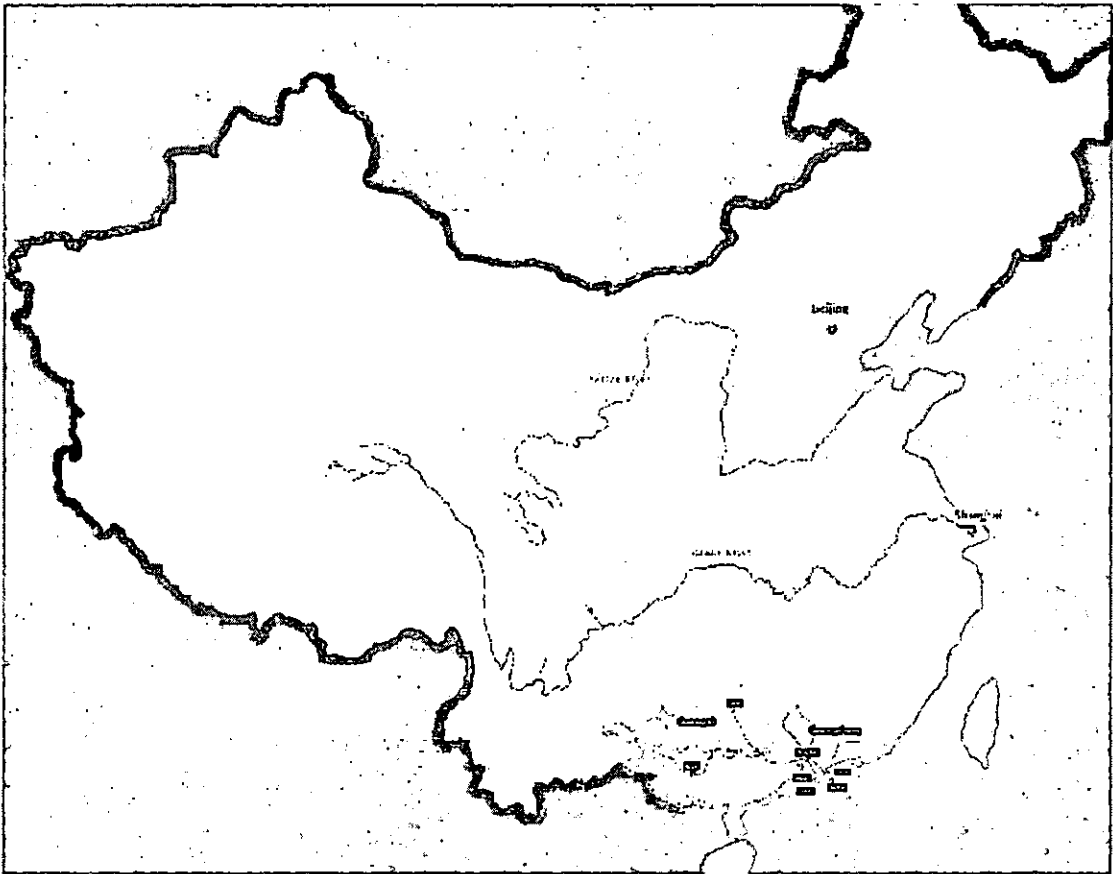
Economic indicators	2001		2002		2003	
	Guangdong	Guangxi	Guangdong	Guangxi	Guangdong	Guangxi
Per capita total income	10,535	6,722	11,961	7,757	13,451	8,294
Disposable income	10,415	6,666	11,137	7,315	12,380	7,785
Average money wage	15,682	9,075	17,814	10,774	19,986	11,953
GDP(100 million yuan)	10,647	2,231	11,736	2,456	13,626	2,735

Source: China Statistical Yearbook in 2002, 2003, and 2004

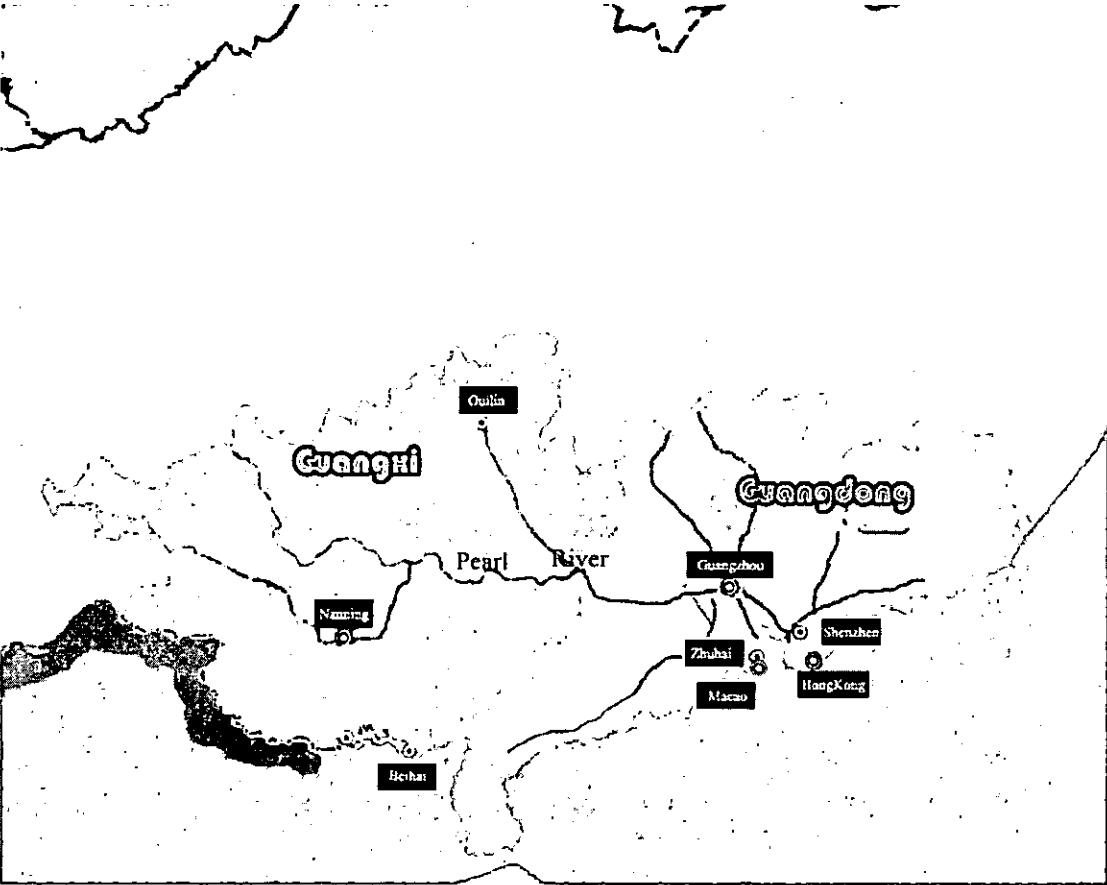
The institutional environment in which the private economy operates is a key factor influencing differences in economic growth and development between the two provinces. The success of economic development in Guangdong depends heavily on the policies that are offered by the national government, particularly in the first phase of China's 'reform and opening'. For instance, the first two special economic areas, namely Shenzhen and Zhuhai, have been built up in Guangdong; most policies to support the private sector have been first applied to this province. Non-state owned banks including state controlled commercial banks and foreign banks were first permitted to be operated in Guangdong. A large amount of investment capital from inland China together with foreign investors poured into Guangdong during the 1980s because unique incentives were offered by the central government. In general, Guangdong took advantage of the national policies relating to the private and financial sectors, particularly in the 1980s. As a consequence, Guangdong has adjusted its economic structure from primary to secondary industry and has improved its economic performance to become the fastest growing province in China on key indicators. In contrast, Guangxi lost a great opportunity to develop its economy during the 1980s. The considerable gap in the level of economic development between the coastal and western regions is now widening, although incentives to reduce the gap have been delivered to western provinces.

The geographical position is another important factor contributing to the economic inequity between the two provinces. Guangdong province is located in the coastal region of south China. The geographical advantages of bordering on Hong Kong and Macao are crucial for Guangdong to absorb investment capital from Hong Kong and Taiwan, which has led to private owned enterprises being developed successfully since the middle of the 1980s. As a consequence, Guangdong has the largest economic capacity and fastest economic development of any province. The prospects for favourable economic development in the Greater Pearl River Delta, which includes Guangdong, Hong Kong and Macao, have recently grown even more since the signing of the Mainland and Hong Kong Closer Economic Partnership Arrangement (CEPA).

Map 4.1 China and its provinces



Map 4.2 The studied areas



5.4.2 Selection of the study sectors

The eight industrial sectors defined as ‘high-technology’ by the Chinese government (Annual Report of National Ministry of Science and Technology, 2002) are:

- Microelectronics and electronic information technology
- Life science and bioengineering technology
- Material science and new material technology
- Energy science and new energy technology and efficient energy-consumption technology
- Ecological science and environmental protection technology
- Medical science and biomedical engineering
- New engineering technology

Of these 8 sectors, two were selected for this study namely electronic information technology and bio-technology. The main reasons are as follows: firstly, these two sectors are the largest high-tech sectors in China, measured in terms of the number of firms (the Report of Innovation Funds; 2002, 2003). Secondly, their annual growth was faster than that of other sectors in China between 1996 and 2002, as shown in Table 5.3. For instance, the annual growth of EIT sector as a proportion of the total of the four largest sections accounted for 68% of additional output in 2002, whereas the bio-tech sector accounted for 22%. Thirdly, it is expected that there may be significant differences in financing high-tech SMEs of the same stage of development between the two sectors because of industrial characteristics.

Table 5.3 Annual growth of output of high-tech sectors in China (1996—2002) (RMB 100 million Yuan)

Main Sectors	1996	1997	1998	1999	2000	2001	2002
	1272	1540	1785	2107	2759	3095	3769
Biotechnology	360	412	433	515	634	722	835(22%)
Aircraft and spacecraft	74	98	87	92	106	124	149(4%)
EIT	725	910	1136	1363	1845	2055	2543(68%)
Equipments and meters	113	121	129	137	174	193	242(6%)

Source: Chinese Statistics of high-tech sector, 2003

Table 5.4 Number of face to face interviews in two phases of the survey

Interviewees	The type of interview	Guangdong		Guangxi		Total
		2004	2005	2004	2005	
Owners/senior managers	Semi-structured	28	4	9	33	74
Bank managers/credit officers	Informal	1	0	1	2	4
Officials	Informal	2	0	1	2	5
Total		31	4	11	37	83

5.4.3 Selection of respondents

The targeted respondents for this study are the owners or senior managers of high-tech SMEs. Therefore it is important for this study to define a high-tech SME for the specific purposes of this research. The definition of a high-tech SME in this research involves three elements: the measurement of the firm's size, its ownership structure, and a definition of 'high-tech' measurement of technology-based firms.

The definition of an SME varies between countries and also depends on the purpose of the study. In general, defining the size of enterprises focuses mainly on several elements: the number of employees, annual sales turnover, ownership structure, profitability, balance sheet, and net assets. This study adopts a quantitative definition from the European Commission that has been used by a number of studies both in Europe and elsewhere. The sizes of the firms in this study are measured by the numbers of employees and categorised into three groups: micro (up to 9 employees), small (between 10 and 49), and medium (from 50 to 249).

Independent ownership structure is also a key factor to identify a high-tech SME. The selected enterprises should be independently owned and should not be a subsidiary of another enterprise. The key point for looking at independent ownership structure is to ensure not only that owners/senior managers make decisions on investment and business strategies independently, but also that the ability of high-tech SMEs to access external finance is not influenced by other firms. The owner-manager's personal approach towards issues e.g. his /her knowledge of external sources and market evaluation, directly influence the firm's behaviour.

Technology-based firms are generally measured by their industrial classification sectors with above-average R&D intensity and above-average proportion of scientists, professional engineers and technicians in the labour force (i.e. Butchart, 1987). However, there have been considerable debates surrounding this definition using measurement of industrial sectors. It has been argued that this definition is based on industrial classification which is 'product' rather than 'process' based. Therefore, parts of some industries which are qualified overall as high technology are decidedly not high

technology in focus (Jones-Evans, 1996). Also, broad industrial categories not classified into high technology industry may contain specific activities which are generally considered as being high technology (Butchart, 1987). Nevertheless, the definition of high technology industrial classification has been utilised in a number of studies focused on technological based firms e.g. a study focused on the spatial distribution of NTBFs in the UK conducted by Keeble in 1994. This thesis also utilises the ideas of industrial measurement to define technology-based firms, the industrial classification sectors used for the purpose of this study is given by the Chinese government, as presented in the earlier section.

In addition to the owner-managers of high-tech SMEs, bank managers/credit officers and government officials are also the targeted respondents in this research. Bank managers/credit officers include those who are working in local branches of the four state-owned banks in the two study provinces. Government officials consist of senior staff who are working in a high-tech park at a national level or working in provincial or local government in the two study provinces.

5.4.4 Sampling methods

A stratified random sampling strategy was adopted in this study. This involves dividing the population into a number of groups or stratum, where members of a group share a particular characteristic or characteristics (Robson, 1993). The potential respondents are then sampled randomly within each stratum. From a statistical point of view, a truly random sampling method enables researchers to accurately quantify and control uncertainty (Lancaster, 2005). A random sampling method means that every member of the population has an equal chance of being selected, which can avoid biases in selecting potential respondents. To successfully conduct a random sampling approach, it is necessary to have a complete and up-to-date sampling frame.

The sampling frames available for this study consist of the lists of firms that registered in high-tech parks and the lists of high-tech SMEs that have been awarded technological status by the Department of Science and Technology at provincial level wherever they are located. The sampling frames are provided by the administration committee of high-tech parks in each city. The potential respondents are not necessarily awarded a status of

a high-tech firm by the governments in terms of the strata identified in this study. The main advantages of using the databases above are firstly that the databases cover the majority of firms in the population within the studied areas. This is because all firms operating in 8 high-tech sectors identified by the Chinese government are allowed to be registered in a high-tech park and then offered tax reduction schemes. Secondly, it provides names and contact details of owners or senior managers, in addition to business names and addresses, as well as other information about firms i.e. the year of formation, business activities, ownership structure, and employment size. This additional information is useful to select potential respondents that meet the strata identified in this study.

5.5 Survey process

It is necessary to emphasise the difficulties of conducting business surveys in China without the researcher being part of a social network before presenting the survey process. Under Chinese business circumstances, potential respondents are unlikely to be interviewed by a stranger because of the fear of business information disclosure. Thus gaining accessibility to targeted respondents is crucial to being able to achieve a significant sample size within limited resources. In order for the study to successfully conduct business surveys, informal discussions with officials in local governments in the two provinces to arrange interview appointments with owners/senior managers of high-tech SMEs were conducted. The author's previous role as a senior researcher in a city government in Guangxi province helped in establishing these contacts.

This study aims to collect data through face to face interviews. The potential interviewees are from different organisations involved in the financing of high-tech SMEs. They include owners/senior managers of the firms themselves, bank managers and credit officers, and officials in government agencies. The key point for doing this is to gain information from different perspectives. For instance, the information offered by the bank managers and credit officers would provide evidence on the financing of high-tech SMEs from the supply side and give insight into the attitudes of staff in local branches towards serving high-tech SMEs.

Interviews with owners/senior managers were conducted by using a semi-structured questionnaire where the interviewer was free to modify question order and adjust to the most appropriate form in the context of the 'conversation'. Face to face interviews with bank managers and government officers were also employed to collect data with a list of open-ended questions. A questionnaire and two lists of questions in both Chinese and English languages have been designed to guide face to face interviews before starting the surveys. Also the set of questionnaires both in English and Chinese languages was slightly revised based on the pilot survey of 4 firms.

5.5.1 Semi-structured interviews

The main research method used in the survey consisted of semi-structured interviews with the owners/senior managers of high-tech SMEs. A semi-structured questionnaire was constructed which was used to guide the interviews. The main reasons for adopting a semi-structured questionnaire was that it combined open-ended and structured questions. Therefore, it allowed the survey not only to follow a fairly standardised set of questions but offered some flexibility of responses. The opportunities for open-ended questions might mean that interviewees were likely to talk about inside information. The open-ended discussion with interviewees was important because it provided the opportunity to listen to financing stories that happened to the firms.

Face to face interviews were employed in this research to gather data. This was judged to be most appropriate in the Chinese context. First, it allowed for a greater flexibility of responses and offered chances to probe on the interesting issues. This method also allowed interviewers to leave out particular questions that seemed inappropriate to a particular interviewee and include additional ones if appropriate (Robson, 1993). Second, potential respondents are unlikely to fill in a questionnaire by post or answer questions through a telephone call under Chinese circumstances. Third, potential respondents are reluctant to disclose their business information about particular financial issues. Thus a face to face interview becomes an efficient method to explore sensitive questions by carefully presenting questions in the form of a two-way conversation. This is because the behaviour of the interviewer can influence the aspiration of the interviewees to talk freely and openly (Robson, 1993). Fourth, the owners/senior managers are likely to talk positively about research issues based on the

greater flexibility of responses because of their management position. A face to face interview can be more flexible and extract more information from the individual than a postal or telephone survey in the hands of a skilled interviewer. However, face to face interviews are time consuming (Robson, 1993) and very expensive, and therefore limits the size of the sample that can be covered.

The face to face interviews were conducted in two survey phases in June 2004 and April 2005 respectively. The main reasons for carrying out two phases of the survey were: firstly, one of purposes in the first phase of the survey was to do pilot study testing within the first 4 interviews. Piloting the survey revealed no obvious problems in relation to the length of interview, or the sequencing of the questions. But the list of the answers in the questionnaire was slightly changed based on the information obtained via the pilot survey testing. For instance, a listed answer of land being allocated to an enterprise free of charge was deleted from the list of options in a closed question of what type of support high-tech SMEs received. This is because local government no longer has a right to allocate land to enterprises in terms of new land law starting from the middle 1990s. In addition, the way to present open-ended questions within interviews was adjusted as a result of the pilot study. For instance, the question of “what external sources did you try to access after the business was started?” was changed to “how did you meet your financial needs since you started the business?” The improved way to present open-ended questions made interviewees talk more freely and openly, and actively tell the researcher about their experiences of trying to obtain funds.

The selected firms were contacted through a telephone call by a number of research assistants who work in government agencies and serve high-tech SMEs in each city. The targeted respondents were invited to assist with the study and were briefly given some background to the survey and about the interviewer. If they could make time in certain period when the interviewer was conducting the survey in the city, interview appointments were made. A reminder telephone call was made half an hour before each interview appointment.

In the first phase of the survey in 2004, a total of 68 high-tech SMEs were approached by a telephone call and invited to participate in an interview. Of the 68 approached, 38 agreed to be interviewed, representing a response rate of 56%. In the second phase of

the survey in 2005, a further 61 high-tech SMEs were contacted through telephone calls and invited for an interview. Of these, 36 agreed to be interviewed, giving a response rate of 60%. Again the list provided by a government agency at the local level and the sampling frame were used to select appropriate interviewees. In total, 129 high-tech SMEs were approached for an interview. Of these, 74 firms were interviewed, representing an overall response rate of 57%. The achieved 74 face to face interviews with owners/senior managers in high-tech SMEs took place in the 4 cities of Shenzhen and Zhuhai in Guangdong province and Guilin and Nanning in Guangxi province. The main reason, in both phases, for those who did not take part in the survey was that the owners/senior managers were too busy to make time for an interview during the period of the survey.

Most interviews were undertaken in the offices or workshops of the respondents. Each interview lasted around 40 minutes; four interviews took place in the restaurant having dinner/lunch with respondents. Some interviews were conducted with an assistant who arranged and drove the researcher to the companies, but the research assistants were never involved in the conversation between the interviewer and respondents. Therefore, the research assistants had no influence on gaining information, although they arranged all interview appointments. Some interviews took place in the evening when respondents were free. The research assistants who arranged the interviews brought gifts for particular respondents, which is part of the Chinese culture.

Given the sensitive nature of the research topic, the difficulty lay in making respondents talk openly. This required that the researcher needed to find more subtle ways of approaching the question. For instance, the answer to the question of “how did you meet your financial needs since you started the business?” given by some respondents was that my firm had no financial problem at all. A further question had to be carefully asked because it may involve disclosure of personal financial status and business secrets, in which the respondents are sensitive. If the follow-up question was “how did you meet working capital e.g. an emergent order signed with your customers?” the respondent might tell you about their experience of fundraisings since the firm has established.

The raw interview data consists of the actual quotations spoken by interviewees. There is no substitute for these data (Patton, 1990). The interview data were noted as fully as

possible in the Chinese language. However, not all the details in many interviews were noted during the period of interviewing the respondent. Therefore, taking notes of major points made by the respondents was very important during the period of the interviewing. The next thing to be done after an interview was to transcribe in the Chinese language as soon as possible. This was done during the time between two interviews or in the evening in the hotel or at home. The interviewer did not tape record the interviews, even though it could increase the accuracy of data collection and permit the interviewer to be more attentive to the interviewees (Patton, 1990). The key factor is that Chinese respondents are less likely to answer questions if being tape recorded since it seems too intrusive. All data collected was interpreted into the English language.

5.5.2 Informal interviews

Four bank managers (two in each province) working in local branch of state-owned commercial banks and being in charge of the loan division were approached and interviewed. It is not necessary for this study to select interviewed bank managers from all four state owned banks. This is because the financial policies and regulations relating to financial intermediaries are the same for all four banks i.e. contractual arrangements adopted to secure a bank loan and the procedure of a loan application. The information collected from one of these banks can therefore be representative of the banking sector in China as a whole. A list of open-ended questions (see Appendix 3) was constructed, which was used to guide the face to face interviews.

Face to face interviews with five officials in government agencies were conducted at the local level in Guangdong and Guangxi. The purpose of interviewing government officials was not only to obtain information about a range of financial support but also to collect data on how high-tech SMEs meet their financial needs in relation to different stages of their development from a government perspective. A list of open-ended questions (see Appendix 4) was constructed and used to guide the interviews.

5.5.3 Questionnaires

The questionnaire was developed based on the literature in both the Chinese and western contexts, as well as questionnaires used in the previous studies e.g. Ethnic

Minority Business in the UK: Access Finance and Business Support (Ram et al., 2002). The questionnaire covered four topics (see Appendices 1 and 2); the profile of the owners/senior managers, background information about the firm, sources and types of finance sought by high-tech firms and used at three stages of their development, and the role of government support. The information about the main owners and firms was devised to be collected through structured questions. The main issues, for instance what financial resources are sought and used in relation to different stages of their development, were dealt by both open-ended questions and structured questions aiming at gaining rich and robust data. Respondents were invited to give their views on how they met their financial needs and their experiences of trying to obtain external finance. The sensitive issues could be asked by the interviewer once the trust had been built up during the interview. In all, there were 54 questions giving a maximum of 175 variables per firm.

The English version of the questionnaire was interpreted into the Chinese language. The specific terms in Chinese language such as start-up, the early stage and the later stage of business development were identified carefully and compared with references in the Chinese context. A discussion with Chinese academics at the University of Zhongshan in Guangzhou as to whether the terms in the questionnaire were clearly and easily understood was conducted.

5.6 Assessing validity of findings

It is important to assess the validity of the research findings based on sample evidence. Internal validity is assessed through accurate measurements of each concept or variable, while external validity is assessed by achieving a representative sample. This section tends to evaluate the internal validity/reliability and external validity/generalisation for this study. Face to face interviews adopted in this research enable the collection of detailed and relevant information. The selection of the sample and stratified random sampling method employed were also important to achieve a representative sample. The research findings of this study can represent the population of high-tech SMEs in EIT and bio-tech in China, although it is obviously limited by the size of the sample of high-tech firms it has been possible to interview.

5.6.1 Internal validity/reliability

Internal validity is the extent to which the research design really allows a researcher to draw conclusions based on the data collected (Balnaves and Caputi, 2001). The reliability of the data collected depends on the adequacy of the way by which concepts or variables are measured precisely. In a positivist methodology approach, the reliability concerns whether an instrument measures what it is supposed to measure (Lancaster, 2005). If using a wrong measurement, a wrong conclusion could be drawn. In addition, the consistency and objectivity of a concept are also important for a positivist approach to reach its reliability.

For the purposes of this study, it is crucial to measure stages of business development since this concept is fundamental to this research. An important consideration is therefore to define and measure three distinct stages of business development, which can be successfully implemented in the surveys. In Chapter 4, a framework was introduced consisting of three development stages which then formed the basis of the questionnaire design. Interviewed owners/senior managers were then asked to identify the stages that were relevant to their business. The key point here is that interviewed owners/senior managers have the necessary depth of knowledge to position their firm in relation to the three stage model. Thus they are more capable than anyone else of distinguishing the stages that their business has been through. The face to face interview method employed allowed the researcher to explain the definition of each stage, thereby ensuring and consisting in the interpretation of the model.

This study examines the availability of each source of finance to high-tech SMEs through measuring how frequently the surveyed high-tech firms obtained funds from each source such as self-finance, bank loans, public/private equity, government grant/loan, and others. The proportion that the surveyed firms actually used each financial source is an appropriate measurement to identify the availability of each source to high-tech SMEs in China. The study attempts to identify whether there are deficiencies between high-tech SMEs and the banks by measuring the average percentage of bank loans in total initial capital, how frequently the surveyed firms obtained a bank loan at different stages of their development, and success rate of applications. Comparisons of the availability of each source between the two study

provinces, the two study sectors, and three stages of business development are made by using Chi-square test or T-tests. In addition, many measurements employed in this study were consistent with the previous studies that focused on SMEs.

5.6.2 Generalisation

External validity/ generalisation are to what extent that the sample is genuinely representative of the population from which the research findings have been drawn (Robson, 1993; Balnaves and Caputi, 2001). This study has designed and implemented the most appropriate survey approach, which allowed the researcher to use quantitative results to make inferences to all high-tech SMEs in EIT and bio-tech sectors in China. The generalisation in the empirical survey approach can be achieved by employing a complete and up-to-date sampling frame and a sampling method, selecting a highly representative sample, and conducting a survey of significant sample size within limited resources, as indicated in the earlier sections. In fact, carrying out a fairly large sample is crucial for studies to make inferences to the population. However, it would be very difficult to fulfil a fairly large sample in the real world (Robson, 1993) with limited resources available. The readers must always make their own judgements about the relevance of findings for their situation (Seale, 1999).

As noted in the earlier section, this study utilised the personal contact to get through the targeted respondents. Generally speaking, it is difficult to undertake business surveys in the Chinese circumstances without the researcher being part of a social network because the targeted respondents are reluctant to participate in surveys. In addition, participants are unlikely to reveal their internal information to other bodies. The personal contact used in this study ensures the accessibility of the researcher to the potential respondents. However, the social network does not influence the attitudes of interviewees towards answering the research questions and the quality of information provided. In addition, firms can be contacted with ease when any further information needs to be collected later on. The main reason given for not responding was that owner-managers were too busy to participate in a face to face interview during the period of the survey.

The face to face interviews conducted in this study enabled comprehensive and relevant information to be collected, as noted in the earlier section. However, the weakness of a

face to face interview method is that it tends to be costly in terms of both money and time. Costs are particularly high when the survey covers a wide geographical area. Furthermore, it is impossible to undertake a comprehensive representative survey with limited resources in China in terms of the size of the Chinese economy. A wider range of geographical areas may be carried out for further study to test the generalisation of the research findings.

5.7 Conclusion

This chapter has discussed the methodological approach and choice of research methods for this study. The main method adopted has been the business survey: selecting Guangdong and Guangxi provinces, EIT and bio-tech sectors as the basis of conducting surveys. A definition of a high-tech SME especially for this study was discussed for the selection of the respondents. Face to face interviews with owners/senior managers were used to collect both quantitative and qualitative data. The research findings will be generalised according to quantitative data gained and make claims to high-tech SMEs in EIT and bio-tech sectors in China as a whole. Qualitative information helps in the interpretation of the research findings. In addition to the owner-managers of high-tech SMEs, bank managers/credit officers and government officials were interviewed to gather information from different perspectives and make a fuller understanding of high-tech SMEs.

This study has achieved a significant sample size within the limited resources. It also ensured its reliability and generalisation of the findings by precisely measuring the concepts and representatively selecting study geographical areas. As a result, this study was able to make comparisons of financing high-tech SMEs between the Eastern coastal and the Western provinces. The limitation of this study is that the sample used was biased towards only the two provinces covered and the two industrial sectors involved.

The achieved 83 face to face interviews (35 in Guangdong and 48 in Guangxi) in total including 74 with owners/senior managers, 4 with bank managers/credit officers, and 5 with government officials were conducted in two phases of the surveys in 2004 and 2005 respectively. The average length of time spent on each interview was about 45 minutes. The interviews were guided with either the semi-structured questionnaire or

the lists of open-ended questions. An enormous amount of information including both quantitative and qualitative data generated will be understood in the results of the following three chapters.

Chapter 6: Stage, Age, Size, Management characteristics, and Growth

6.1 Introduction

It is essential to give an overview of the principal characteristics of the surveyed firms e.g. stage, age, size, management characteristics, and growth before we address answers to the research questions set out in Chapter 5. High-tech SMEs originally emerged in China in the mid-1980s and were initially supported by their supervisory agents e.g. universities, research institutes, and local governments, as discussed in Chapter 3. Over the past two decades, the institutional and business environments for emerging high-tech SMEs have improved dramatically since the high-tech sector has been recognised as an engine for the further growth and development of China's economy. Under the institutional and business environments from the late 1990s, an increasing number of outstanding personnel with either technical or management background have set up high-tech businesses which have grown rapidly. This chapter seeks to examine the key features of rapidly growing high-tech SMEs, providing the context for analysing the financial strategies used by high-tech SMEs in the next chapter. It also attempts to make a comparison between the two study geographical provinces and industrial sectors in this respect.

Section 6.2 explores the development stage, age, size, and location of the surveyed firms. Management characteristics i.e. business formation and ownership and organisation are examined in section 6.3. Section 6.4 presents the performance and growth of surveyed firms.

6.2 Stage, age, size, and location

Table 6.1 provides a cross tabulation and a distribution of the sample by the development stages, geographical provinces, and industrial sectors. The sample of 74 surveyed high-tech SMEs consists of 32 firms located in Guangdong and 42 in Guangxi. All 74 firms are categorised into 3 groups according to their stages of development as defined for this study; 9 firms are at the start-up, 26 firms at an early stage, and 39 at a later stage. It is necessary to indicate that all 74 firms within the sample have been through/were in the start-up stage, 65 firms through the early stage, and 39 firms through the later stage.

Table 6.1 The sample stratification

Stage	Guangdong		Guangxi		Total
	EIT	Bio-tech	EIT	Bio-tech	
Start-up	3	1	3	2	9
Early stage	5	2	14	5	26
Later stage	17	4	14	4	39
Total	25	7	31	11	74

6.2.1 The stages of development

The interviewed owners/senior managers were asked how long they believed the business has remained in the start-up and the early stages. Table 6.2 provides the mean and median values by province and sector. It shows that firms remained at the start-up stage for an average of 9 months, and the early stage for an average of 22 months. It appears that the start-up stage for the surveyed firms was relatively short, compared to a few years for firms in European countries holding unproven technology (Oakey, 1995, Kolfsten and Dahldtrand, 1999). The reason why the start-up stage was relatively short in China is that the majority of the surveyed firms tended to apply either existing advanced technology or existing technology to their products and services. Only one firm in bio-tech in Shenzhen claimed that they developed a new medicine that was new to the industry, which took several years to develop. A few firms directly bought the

patents of a new medicine from state owned research institutes at low cost. However, most of the surveyed firms developed their products/services in the years prior to the formation of their businesses while the owners worked in state owned research institutes, universities, or large state owned enterprises. Only 3 firms had been independently developing their products and services after they established their businesses, without obtaining any support from other projects/businesses owned by the same owner/s.

The main reason for the short duration of the start-up and the early stages may be inferred from comments made by the interviewed owners/senior managers. A number of them in the two study provinces claimed that *“we have to produce and market our products/services in a short period once the firms have been established because of a lack of sufficient funds”*. Furthermore, a firm in Nanning was interested in developing a brake alarm system, while they were currently producing an instrument for bactericide of agriculture foods. The reason given by the interviewed owner was that *“we could generate sales turnover through producing the instrument shortly and without a large size of investment capital required. Then we can invest the profits from the instrument in developing R&D and innovation of the brake alarm system”*.

The cases above suggest that the main concern for firms is to generate sales turnover as quickly as possible once they become established. This is because the firms have to rely heavily on sales turnover to cover operating expenses. It therefore implies that high-tech SMEs in China are unlikely to be able to develop an original innovation to the industry under the current market conditions. They are unlikely to be able to fund a start-up process over a few years in order to develop an original technology which can then be applied to the development of innovative products and services. In other words, there is a lack of sufficient resources to develop an original technology because highly innovative products and services may take a couple of years or even longer to develop, as noted in Chapter 2.

Table 6.2 Duration in start-up and early stage by province and location (month)

Duration in each stage	Total			Guangdong/Guangxi			EIT/bio-tech		
	No.	Mean	Median	No.	Mean	Median	No.	Mean	Median
Start-up	72	8.6	4.5	31/41	9.1/8.2	6.0/4.0	54/18	7.2/12.7*	4.5/5.0
Early stage	64	21.6	24.6	27/37	20.9/22.2	24.0/24.0	48/16	20.2/25.9*	24.0/24.0

Asterisks in the first column of a row group indicate statistically significant differences between two sectors based on independent sample test (**=significant at the 5% level or better, *=significant at the 10% level or better)

Table 6.3 The distribution of firms by date of formation in province and sector

	Before 1992		1992--1999		2000 and after	
	No.	%	No.	%	No.	%
All	4	5	24	32	46	62
Guangdong	1	3	16	50**	15	47*
Guangxi	3	7	8	19	31	74
EIT	3	5	18	32	35	63
Bio-tech	1	6	6	33	11	61

Asterisks in the above row of a column group indicate statistically significant differences between two sectors and provinces based on Chi-square tests (**=significant at the 5% level or better, *=significant at the 10% level or better)

For example, a firm in Shenzhen that invested RMB 2 million in developing a game programme closed down two years after the firm established. Although sales turnover was expected to be generated in a year, the founding team of 8 owners were unwilling to invest any more. The reason for closing down given by the interviewed owner was that the founders were concerned that products from its competitor would be launched on the market shortly. This case implies that owners of high-tech SMEs are unlikely to focus on medium and long-term projects since the kinds of products that high-tech SMEs are developing have a short life.

Table 6.2 indicates that there are statistically significant differences in duration at start-up stage between the two sectors in the survey sample. Bio-tech firms remained in the start-up stage longer than EIT firms. The duration of the surveyed firms in the start-up stage varies between the sectors because some bio-tech firms take a long while to obtain permission from the national government for production and marketing. In addition, the duration in the start-up stage depends on whether the firms develop an original technology and apply then it to their products and services. The table reveals that there is no statistically significant difference in the duration of the early stage between the high-tech firms in the two provinces.

6.2.2 The age of the enterprises

Table 6.3 provides a breakdown by province, sector and age, where formation of firms are categorised into three groups; before 1992, between 1992 and 1999, and since 2000 in line with the development phases of the institutional environment relating to the private sector in China, as noted in Chapter 3. It is worth noting that the age of surveyed firms in this study is based on the original registration rather than re-registration as there have been recent changes to business law and firms are no longer able to qualify under 'red hat' status. Some 15% of the surveyed firms that were state owned have been re-registered within the sample. The table reveals that 62% of the surveyed firms were formed since 2000, 32% established between 1992 and 1999, and only 6% before 1992. This reflects the trend of establishing high-tech SMEs in line with the changes in policies and regulations relating to the private sector. Thus this demonstrates that the formation of new high-tech businesses is influenced by the reform of state owned

institutions and a range of support offered by governments to high-tech firms, as recognised in Chapter 3.

An interesting finding is that there is a statistically significant difference in the formation of businesses between the two provinces. Table 6.4 indicates that a larger proportion of the surveyed firms were formed between 1992 and 1999 in Guangdong, compared to a larger proportion established since 2000 in Guangxi. In other words, the average age of firms in Guangdong was older than those in Guangxi. This reflects the earlier wave of privatisation in Guangdong, as noted in Chapter 3. An extreme case in the sample is a 40 year old firm that was a state owned pharmacy manufacturer located in Nanning. The table indicates that the majority of high-tech SMEs in China are young, and younger than SMEs in general because high-tech SMEs did not start to originally emerge until the middle 1980s. There is no statistically significant difference in the date of formation between high-tech SMEs in the two sectors.

6.2.3 Employment size of the enterprises

The interviewed owners/senior managers were asked what was/is the total number of employees at 12 months prior to the interview / on the date of the interview. Table 6.4 presents the mean and median employment sizes by province and sector at 12 months prior to the interview and on the date of the interview. It shows that the average size of the surveyed firms was 51 employees at 12 months prior to interview, but increasing to 55 employees a year later. It indicates that firms both in EIT and bio-tech sectors stood still, or increased only slightly, in employment terms during the year. The reasons for little growth in employment in this 12 month period are: first, the growth of firms was efficiently managed by contracting out for production and second, the growth was mainly restricted by less ability of firms to market products in a wider geographical area. The extreme cases were the smallest one with 3 employees at start-up and the largest one with 242 employees at the later stage.

An interesting finding is that the average size of surveyed firms varies across the two provinces, due primarily to the statistically significant differences in the average size of firms in the EIT sector. The average size firm in Guangdong employs 75 employees at 12 months prior to the interview, increasing to an average of 80 employees a year later,

while the average size firm in Guangxi employed 33 and 36 employees respectively. It indicates that the average size of firms in Guangdong is twice as large as in Guangxi. The average size of EIT firms in Guangdong is three times larger than that in Guangxi. Furthermore, the median figures show that firms were smaller, especially in Guangxi. A significant difference in employment size between high-tech SMEs in the two provinces relates to a fact that more EIT business opportunities are generated in Guangdong because of its leading position in China as a whole. Although the average size of firms in the bio-tech sector in Guangdong was larger than in Guangxi, there is no statistical difference between the two provinces.

Table 6.5 shows the distribution of employment size groups in the sample by province and sector. The employment size of firms was categorised into three groups: micro with up to 9 employees, small with between 10 and 49, and medium with between 50 and 249. The table reveals that the distribution according to employment size in the sample varies across the two provinces. The majority of the surveyed firms were micro and small size, particularly in Guangxi. There is a statistically significant difference in the distribution of size groups between the two provinces. The table shows that 47% of the surveyed firms in Guangdong were medium size, compared to 17% of firms in Gaungxi, whereas 62% of firms in Guangxi were small size. However, there is no statistically significant difference in the proportion of size groups between the study sectors.

Table 6.4 The average size of firms by province and sector

	Total			Guangdong/Guangxi		
	No.	Mean	Median	No.	Mean	Median
12 month prior to interview						
Total	74	51	22	32/42	75**/33	45/22
EIT	56	48	20	25/31	76**/26	50/20
Bio-tech	18	58	35	7/11	68/51	33/36
On the date of the Interview						
Total	74	55	22	32/42	80**/36	50/20
EIT	56	51	21	25/31	82**/26	50/14
Bio-tech	18	67	30	7/11	72/63	44/22

Asterisks in the first column of a row group indicate statistically significant differences between two regions based on independent sample test (**=significant at the 5% level or better, *=significant at the 10% level or better)

Table 6.5 The Distribution of firms by size group, by province and by sector

	12 month prior to the interview						On the date of interview					
	Micro		Small		Medium		Micro		Small		Medium	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
All	14	19	38	51	22	30	10	14	38	51	26	35
Guangdong	5	16**	12	38	15	47	2	6	13	41	17	53
Guangxi	9	21	26	62	7	17	8	14	25	60	9	21
EIT	12	21	28	50	16	29	8	14	28	50	20	36
Bio-tech	2	11	10	56	6	33	2	11	10	56	6	33

Asterisks in the first row of a column group indicate statistically significant differences between two provinces and sectors based on Chi-square tests (**=significant at the 5% level or better, *=significant at the 10% level or better)

One of the main reasons for the differences in the mean size of firms between the two provinces is that the average age of the firms in Guangdong is older than in Guangxi, as indicated in the earlier section. Therefore, firms in Guangdong have survived, expanded and progressed away from micro or small size. But the majority of firms in Guangxi were still micro or small in size. This evidence suggests that opportunities for growing the business in Guangxi are not the same as in Guangdong. Another reason for the differences is limited market and resources available for some firms in Guangxi. It can be inferred from comments made during interviews with owners/senior managers and a government official. A number of small size manufacturers in Guangxi claimed that they were currently marketing products in Guangxi by cooperating with the local networks. As one interviewee commented, *"We have to remain small because of the limited market and limited resources available to expand"*.

An official in Guangxi claimed: *"about 70% of high-tech firms in the high-tech park in Nanning were struggling and remaining small because the owners were reluctant to accept external finance within an agreement of being partnership. This is because the owners lack market-oriented strategy"*. These cases suggest that the business environment in Guangdong is better than in Guangxi in terms of financial sources available and marketing distribution.

The survey evidence shows that 11% of surveyed firms in Guangxi focused only on local markets at start-up stage; in contrast firms in Guangdong provided their products/services in both local and other non-local markets. The local market identified for this study is the city or province where the firms are located. As Chapter 5 described, comparisons in the development of the private sector between Guangdong and Guangxi show that preferential policies towards private firms were firstly introduced and experimented within Guangdong, some a few years ahead of other provinces in China. Therefore, the private economy has had time to generate and accumulate more individual wealth in Guangdong than in other areas of China. For instance, it can be easier for firms located in Guangdong to sell their products and services in the domestic market as a whole based on information available, marketing channels, and the reputation of more developed province. In addition, it is possible to obtain a large amount of funds from individuals in Guangdong.

The interviewees were asked to explain why the firm was at its present location. The main reasons given were categorised into five groups: better environment and service, convenient transportation, hometown, a more developed network, and cheap labour. Table 6.6 shows that 55 of the surveyed firms were located on a high-tech park and 19 were located outside of a high-tech park. It also shows that a better environment and services were considered the most important factor to influence choice of location within a province/city, following by having a personal network. In addition, there are statistically significant differences in the relative importance of location factors between the two provinces and also between firms locating inside and outside of the parks, as shown in the table.

Table 6.6 The main reasons for the location by Park and Province

	All	Service		Transportation		Hometown		Network		Cheap labour	
	No.	No.	%	No.	%	No.	%	No.	%	No.	%
In the Park	55	47	86**	4	7	27	49	41	75	10	18
Outside Park	19	11	58	6	32	6	32	17	90	6	32
Guangdong	32	29	91**	9	28	4	13	20	63**	5	16
Guangxi	42	29	69	1	2	29	69	38	91	11	26

Asterisks in the first row of a column group indicate statistically significant differences between two provinces based on Chi-square tests or Correlation tests (**=significant at the 5% level or better, *=significant at the 10% level or better)

Table 6.7 The distribution of firms according to type of business foundation and by province and sector

	New start up		Non business spin-off		Business spin-off		Management buy-out	
	No.	%	No.	%	No.	%	No.	%
All	63	85	9	12	1	1	1	1
Guangdong	29	91	2	6	0	0	1	3
Guangxi	34	81	7	17	1	2	0	0
EIT	50	89*	6	11	0	0	0	0
Bio-tech	13	72	3	17	1	6	1	6

Asterisks in the first row of a column group indicate statistically significant differences between two provinces and sectors based on Correlation tests (**=significant at the 5% level or better, *=significant at the 10% level or better)

6.3 Management characteristics

The largest group of surveyed firms were formed as entirely new start-ups, with the second largest group being spin offs from non-business organisations. Both of these groups were privately and jointly owned and were managed by a number of individuals with a high level of experience both in technological and management fields, coming from previous backgrounds associated with high levels of education and skills. This is a consequence of further reform of state owned institutions e.g. research institutes, financial intermediaries, governmental departments, and state owned enterprises. This is also a consequence of a range of support offered by governments to high-tech SMEs e.g. preferential measures and resources available.

6.3.1 Business foundation

Table 6.7 analyses the methods of business foundation in the sample. It breaks business formation into four categories: entirely new start-up; non business spin-off; business spin-off; and management buy-out. New start-up means that firms were newly established without having been part of an existing organisation. Non business spin-off includes firms that split from public institutions e.g. state owned research institutes, universities, and local government; while a business spin-off split from an existing enterprise. The patterns of start-up are shown for the two study provinces and sectors. The table shows that entirely new start-ups were the dominant mode of foundation, followed some way behind by non business spin-offs. There is no statistically significant difference in distribution of business foundation between the two provinces. As the table indicates, non business spin-off as a form of business foundation was a method to start high-tech businesses in China, particularly in Guangxi. It is consistent with the policy that local governments, universities, and state owned research institutes were encouraged to set up high-tech businesses in the middle 1980s, as recognised in Chapter 3. However, there is a statistically significant difference in distribution of business foundation between the two selected sectors, with bio-tech firms adopting a wider range of methods to set up their businesses than EIT firms. This might be something to do with the features of the industrial sectors. For instance, the bio-tech

sector is more research-based and capital intensive, and thus needs to gain support from a wider range of business founders.

6.3.2 The main owners

The interviewees were asked what age group the main owner/s was/were on the date of the interview. In cases where there were more than three owners, the information was sought for the three largest shareholders within the firm. The responses are categorised into three age groups: under 30, between 30 and 45, and over 45. Table 6.8 shows that on average the business owners are younger than 45 year old. It indicates that 74% of owners were born after 1960 and therefore were given the opportunities to take a national entrance exam for obtaining an offer from universities after China's 'reform and opening' since 1978. There is no statistically significant difference in the age group of the main owners between the two provinces and sectors.

The table also shows that 84% of the surveyed firms were owned by men; only 1% by women; while 16% were co-owned by both men and women. It is clear that a much larger proportion of men were running high-tech businesses than women. This is similar with the research findings focusing on SMEs in the UK (Ram, et. al., 2002; Cosh and Hughes, 2003). There is no statistically significant difference in the gender of the owners between the two provinces and sectors.

The highest qualification held by the main owners is shown in Table 6.9. It indicates that 96% of the owners were educated to university degree level. Among these, 8% hold a doctoral degree and 23% hold a masters degree. Obviously, the level of education of business owners has increased since the second half of the 1990s. Across the provinces, business owners had a high level of education and qualifications in the field of their business and there is no significant variation in this respect between the two provinces.

What are the main factors behind the findings? Firstly, the decision of the Fifteenth Party Congress and amendment of the Constitutions show that the central government is serious about developing the private sector. Secondly, government at different levels recognised the high-tech sector as an engine of further growth and development in China's economy, therefore governments at provincial and city levels provided a range

of competitive support aimed at attracting potential entrepreneurs to set up new business and attracting existing enterprises from other regions with independent intellectual property. Thirdly, the further reform of state owned institutions led to their advantages i.e. offering greater job security and social benefits (residence right, housing, health and education) being lost.

Table 6.10 provides a cross tabulation of the sample according to the owners' background. It shows that the majority of owners had a high level of experience and came from previous backgrounds associated with high levels of education and skills. It shows that 26% of owners were from state-owned enterprises, 16% from state-owned research institutes, and 10% were former employees of universities. A large proportion of entrepreneurs with a background in state enterprises and research institutes left their former jobs because of relatively low wage levels. Since the mid-1990s, technological experts and academics in state-owned enterprises and research institutes have been earning much less than those in universities which were then permitted to charge student' tuition fees which can be allocated as bonuses. Therefore there has been a stronger financial motive for employees of state enterprises and research institutes to set up a business where they may be able to increase their rewards. This demonstrates that the attitudes of potential entrepreneurs towards starting up their businesses are influenced by macro-policies and regulations relating to other sectors of society.

Table 6.8 The distribution of age and gender by province and sector

	All	Age						Gender					
		Under 30		30-45		Over 45		Male		Female		Co-owned	
		N	%	N	%	N	%	N	%	N	%	N	%
All	170	17	10	109	64	44	26	61	84	1	1	12	16
Guangdong	66	5	8	41	62	20	30	26	81	0	0	6	19
Guangxi	99	12	12	63	64	24	24	35	83	1	2	6	14
EIT	128	16	13	82	64	30	23	46	82	1	2	9	16
Bio-tech	42	1	2	27	64	14	33	15	83	0	0	3	17

Table 6.9 The distribution by the highest qualification of owners and province

	All	None		Up to high school		Diploma		First degree		Masters degree		Doctoral degree	
	N	N	%	N	%	N	%	N	%	N	%	N	%
All	173	7	4	2	1	15	9	96	55	39	23	14	19
Guangdong	72	3	4	1	1	4	6	43	60	16	22	5	7
Guangxi	101	4	4	1	1	11	11	53	52	23	23	9	9

It is worth noting that the Guangxi government provides a range of support to attract academics, based overseas, to return back to China to establish their businesses in Guangxi. For instance, all academics (who did not have to be from Guangxi originally) holding a doctoral degree would receive a grant of RMB 200,000 Yuan as long as they set up their business in a high-tech industrial sector (defined by the national government) in Guangxi. The table records that a larger proportion of the owners returned back from overseas in Guangxi than in Guangdong. This may be evidence to suggest that an improved institutional environment in Guangxi attracted more previously academics, based overseas, to return to set up a business.

The majority of owners were used to working in a R&D environment and have developed sufficient technical expertise in the years prior to the formation of their owned firms. In addition, owners from a former business or state owned firm had valuable experience in business management. A mixture of the working experience of owners made contributions that not only shortened the duration in the start-up stage, but also provided superior technical expertise and a network of established potential customers, producing faster sales generation. An owner of a business solution firm in Shenzhen, who used to work in Customs in Shenzhen and then owned a Customs service agency which specialised in applying goods declaration for companies, claimed that *“the initial customers were former customers from my previous job, which greatly decreased the costs of marketing”*.

Table 6.10 The distribution by previous working experiences of owners and province

	All		Guangdong		Guangxi	
	N	%	N	%	N	%
All	167		72		95	
Senior members from state owned enterprises	46	28	18	25	28	29
Academics from research institutions	27	16	13	18	14	15
Owners of private firms	17	10	6	8	11	12
Academics returned back from overseas	23	14	5	7	18	19
Academics from universities	17	10	6	8	11	12
Civil servant from government	9	5	4	6	5	5
Other mainly from none state owned businesses	28	17	20	28	8	8

The survey evidence indicates that 87.8% of firms were jointly owned by individuals. Among these, 52.7% were owned by three or more owners, 35.1% by two owners, and only 12.2% by one individual. The majority of co-owners of the firms knew each other very well for many years before they started their jointly owned businesses. They combined different skills and experiences that were needed to develop a high-tech business e.g. technological expertise/know how, management skills, and ability to raise funds. An owner of the firm running a software programming and marketing business in Nanning claimed that *with two of his classmates he set up a business in 1997 after 6 years of working in marketing and a technological environment in a state owned institution*. A number of the surveyed firms claimed that *their owners were from either the same research institutes or same state owned enterprises. Frequently they used to work in the same technological or management division*.

The cases above demonstrate that the surveyed firms had assembled an effective and stable team of founders combining sufficient technical expertise and management skills. The integration of these various human resources is crucial to starting a business under the current business circumstances in China. An effective ownership team is a key factor to improve the internal capabilities of the firm. In addition, a good integration of personnel can decrease the costs of developing products/services and marketing indirectly. The following evidence shows how the surveyed firms kept an effective and stable team of the owners when they needed external equity.

Several interviewed owners/senior managers claimed that *they tried to avoid recruiting more new partners to the board committee of the firm, even in situations where they needed funds in the absence of debt finance. A method of limiting the number of board members but also fundraising from external equity is to cooperate with investors for the duration of specific projects. Once the project finished, their cooperation ended*.

The evidence above suggests that high-tech SMEs in China would prefer to use expertise external to the firms on a project basis. Thus they could limit the number of board committees and avoid conflicts over decision making. This implies that owners

are unwilling to lose control in relation to decision making of their business development.

Table 6.10 reveals that a larger proportion of the owners in Guangdong came from non state owned enterprises i.e. foreign and Sanzi (firms owned by Hongkong, Taiwanese, and Macau) than in Gaungxi. It implies that the internal capabilities of firms in Guangdong were better than in Guangxi, although owners in Guangxi were more likely to have been educated overseas. The work experiences of owners in a Sanzi or foreign firm are useful to improve their capabilities to operate their owned businesses in a market-based system.

In addition, the majority of the owners/senior managers have worked elsewhere before they moved to Shenzhen and Zhuhai, which has allowed them to develop an advanced network of former colleagues. A senior manager in a medicine research institute in Zhuhai claimed,

“It is easy for me to access the key laboratories both in Beijing and Guangzhou because I used to work in a key hospital in Beijing and my classmates are working in a key hospital in Guangzhou”.

An owner in Shenzhen claimed, *“The initial customers of my firm were friends of mine whom I used to study or work with in Xian and Guilin respectively. Currently, most of them are working in research institutes as senior staff, therefore can influence purchase decision making”.*

These cases suggest that an advanced network can influence the size of the market share a company can access and this in turn influences the size of the enterprise.

An interesting finding is that only one firm in the sample, a research institute in medicine that was founded by a retired academic in Zhuhai in 1992, claimed that it was a family business. This suggests, therefore, that high-tech SMEs in China tend not to be owned by families. There is a marked difference in whether the firms have been controlled by families between high-tech SMEs and SMEs in general. As a study undertaken by the China Federation of Industry and Commerce (ACFIC) found, 98% of

the private enterprises were family managed (International Financial Corporation, 2000). It suggests that owners in high-tech SMEs have better management skills through making use of team management.

6.3.3 Ownership and organisation

The ownership characteristics of the sample firms are shown in Table 6.11 and reveals that 91% of them were privately owned. They include those owned by academics who had returned back from overseas, and were registered through Chinese RMB Yuan. In fact, they could be classified as foreign firms since the owners were not Chinese passport holders according to the business law. Only 1% of the surveyed firms were listed on the Chinese stock market and were publicly owned; only 1% were state or collectively owned; and 3% were owned by foreign investors (in all cases owned by Taiwanese). These findings are consistent with previous studies in that they indicate that the majority of SMEs in general are privately owned and that the private sector is a driving force of growth and development of China's economy.

Table 6.11 The distribution by ownership and province

Ownership type	All		Guangdong		Guangxi	
	No.	%	No.	%	No.	%
Private	67	91	28	88	39	93
Collective and state owned	1	1	1	3	0	0
Foreign investors	2	3	1	3	1	2
Public owned	1	1	0	0	1	2
Other	3	4	2	6	1	2

The main reasons for the majority of high-tech SMEs being privately owned are firstly that the economic environment has been legitimised and has become more friendly for the private sector since the second half of the 1990s, as described in Chapter 3. The institutional environment for high-tech SMEs has also improved through a range of support provided by government at different levels. For instance, many cities set up 'software parks' that offered newly established software firms rent free offices for three years as well as tax exemptions for five years. Therefore, more and more academics who were used to working in state-owned institutions, as well as the owners of already established businesses, have gained greater confidence and improved incentives to set

up a new high-tech business. Secondly, it has been common for new business ventures to be established from existing projects under research institutes or universities but operating autonomously after a process of restructuring by the institutions and universities. Some 13% of surveyed firms (calculated according to Table 6.7) have been re-structured and become privately owned. In other words, some state owned enterprises or collectives have been transformed into private ones.

The average percentage of employees, per enterprise, with academic degrees is shown in Table 6.12. The table reveals that an average of 65% of employees in the surveyed firms had attained academic degrees (at least at diploma level). There is no significant difference in the percentage of employees with academic degrees across the two provinces. It indicates that in the high tech sector in China there is a trend towards recruiting highly qualified staff, or graduates from at least colleges. A number of the interviewees both in Guangdong and Guangxi commented that *it is not difficult to recruit staff with academic degrees*, or as one interview put it:

"As you know, we have an abundance of new generation labour force; among them many people have attained a high level of education. Friends of ours often ask if we need new staff because they want to introduce their children to work in our companies. We may not consider recruiting staff without an academic degree, or at least at diploma level".

Table 6.12 The percentage employees with academic degree by province

	N	Mean	Std. deviation	Std. error mean
All	71	66	27	3
Guangdong	29	64	25	5
Guangxi	42	66	29	4

Note: 3 cases are excluded

A number of interviewed owners or senior managers of business solution firms claimed: *"it is not difficult for us to fill a vacancy"*. The difficulty is to recruit senior staff such as programme and system designers. However, owners/senior managers work usually on key parts of the projects such as designing a system of programmes.

The findings and cases above indicate that currently in China many college graduates are working in private high-tech SMEs. This is an interesting finding in view of the fact that previous studies demonstrated that many college graduates were unwilling to work in the private sector because of its poor reputation and lack of security, even if they would be paid a higher wage than in state owned firms (International Financial Corporation, 2000). This suggests that there have been some recent changes in this respect. The difficulties in employing and retaining skilled workers in the private sector have reduced recently, particularly in high-tech sectors. The main reasons are, firstly, that state owned firms no longer offer greater job security and the social benefits that they previously did. Secondly, labour demand from state owned firms has been decreasing because the number of state owned firms has been reduced, according to a policy called *Zhuada fangxiao*, meaning “keeping the larger ones and letting the smaller ones go” starting in 1995. The purpose of doing this is to reform the smaller state owned enterprises with poor performance through reorganisations, mergers, acquisitions, leasing, and sales. Thirdly, the number of graduates from universities has been increasing year by year producing an abundant supply of highly qualified labour with at least a diploma level in China. Finally, existing skilled local workers who have been laid off from state owned enterprises further swell the supply of qualified workers. These factors have contributed to a situation where state owned enterprises have lost their advantages in recruiting staff. In contrast, the private sector with its competitive advantages in the market becomes more attractive in recruiting and retaining skilled workers.

6.4 Performance and Growth

The above section analysed distinctive characteristics of the formation, the background of the main owners, and the ownership of high-tech businesses in China. This section addresses the performance and growth of the surveyed firms. This study adopts four measurements of SME performance and growth namely sales turnover growth, employment growth, profitability, and the proportion of sales turnover exported.

6.4.1 The growth of sales turnover and employment

The survey included a question about how the total value of sales turnover compared in 2003/2004 with 2002/2003. It breaks growth performance of sales turnover into four groups: an increase of more than 20%; an increase of between 10 and 20%; no change; and a fall of 10% or more. Table 6.13 provides a cross tabulation of the sales turnover growth by province, sector, stage, and size. It reveals that between 2002/2003 and 2003/2004, 59% of the surveyed firms achieved growth in sales turnover of 20% or more. The differences in sales turnover growth between the two provinces and the two selected sectors were small and not statistically significant. The table reveals that the more mature the firms, the faster the growth they achieved. In addition, a larger proportion of small and medium size firms achieved growth in sales turnover of 20% or more than the micro size firms. This finding might be explained by the fact that the majority of the surveyed firms were young and formed after 1992, which stood still in the stage of rapid growth. Presumably, micro size firms are willing to keep small since the owners are reluctant to take on additional partners, as commented in the previous section.

Table 6.13 The growth of sales turnover by province, sector, stage, and size

Frequency	All	≥ 20% higher		10-20% higher		About the same		≥ 10% lower		Not applicable /don't know	
	N	N	%	N	%	N	%	N	%	N	%
All	66	39	59	8	12	8	12	5	8	6	9
Guangdong	28	14	50	5	18	4	14	0	0	5	18
Guangxi	38	25	66	3	8	4	11	5	13	1	3
EIT	49	30	61	5	10	5	10	4	8	5	10
Bio-tech	17	9	53	3	18	3	18	1	6	1	6
Start-up	3	1	33	1	33	0	0	1	33	0	0
Early stage	28	10	42	2	8	5	21	2	8	5	21
Later stage	39	28	72	5	13	3	8	2	5	1	3
Micro	8	3	38	2	25	1	13	2	25	0	0
Small	32	19	59	1	3	5	16	1	3	6	19
Medium	26	17	65	5	19	2	7	2	7	0	0

Asterisks in the first row of a column group indicate statistically significant differences between two provinces and sectors, and three stages and sizes based on Correlation test (**=significant at the 5% level or better, *=significant at the 10% level or better)

The survey included a question on the number of employees per firm at the date of the interview and 12 months prior to the interview, enabling an estimate of employment change during the year. Employment change is categorised into four groups: increasing, no change, declining, and non response. Table 6.14 provides a cross tabulation of employment growth by province and stage. It shows that 34% of the surveyed firms experienced an increase in employment during the year, while 41% of the firms remained unchanged in employment, and 24% experienced declining employment over a period of one year. The reason for reducing the size of employment given by the interviewed owners/senior managers was to decrease labour costs. This suggests that reduction in labour costs became a dominant method for high-tech SMEs to overcome financial constraints, which is analysed further in Chapter 7.

Table 6.14 Employment growth by province and stage of development

	All	Increasing		About same		Declining		Not applicable	
	N	N	%	N	%	N	%	N	%
All	74	25	34	30	41	18	24	1	1
Guangdong	32	14	44	12	38	5	16	1	3
Guangxi	42	11	26	18	43	13	31	0	0
Start-up	9	3	33	2	22	3	33	1	11
Early stage	26	6	23	13	50	7	27	0	0
Later stage	39	16	41	15	39	8	21	0	0

Asterisks in the first row of a column group indicate statistically significant differences between two provinces and stages based on Chi-square test (**=significant at the 5% level or better, *=significant at the 10% level or better)

There is no statistically significant difference in employment change between the two selected provinces. Due to the sample being categorised into three stages and four groups, it is not possible to make a correlation test between the development stages. It is therefore difficult to draw a conclusion from the sample in terms of the relationship between the stage and trends in employment. An extreme case is a bio-tech firm at an early stage of development in Nanning. In this firm the number of employees increased from 40 to 120 in one year, or at an annual rate of 300%. The key factor in this firm was that it recruited a new partner for the purpose of fundraising and to promote business

expansion. The case above implies that growth in employment and sales turnover can be crucially affected by the financial strategies adopted by a firm.

6.4.2 Profitability

The survey included a question asking each firm if it had made a profit, loss, or broken-even over the last financial year, prior to the interview. Our survey evidence shows that the majority of the surveyed firms were enjoying profitability in 2003 or 2004. Table 6.15 shows that, in relation to the last financial year, 75% of surveyed firms were profitable, 7% had broken even, and 18% were loss making. This finding must be borne in mind when we examine the financing of firms in Chapter 7. This is because retained earnings are a key source of finance. There was no statistically significant difference in profitability between the two study provinces.

Table 6.15 The profitability in 2002-2003/2003-2004 by province and stage

	All	Making profit		Breakeven		Loss making	
	N	N	%	N	%	N	%
All	74	53	75	5	7	13	18
Guangdong	29	22	76	3	10	4	14
Gaungxi	42	31	74	2	5	9	21
Start-up	6	1	17	1	17	4	67
Early stage	26	15	58*	2	8	9	35
Later stage	39	37	95	2	5	0	0

Asterisks in the first row of a column group indicate statistically significant differences between two provinces and sectors based on Chi-square tests (**=significant at the 5% level or better, *=significant at the 10% level or better)

Table 6.15 also reveals, as we might expect, that there are statistically significant differences in profitability between firms in the early and the later stages of development. It shows that 95% of later stage firms made profits, but some start-up and early stages firms made a profit as well. There are several reasons for explaining why some start-up and early stage firms were able to generate profits. Firstly, the products and services have been developed before a new business venture has been registered, as noted in the previous section. Secondly, the majority of the surveyed firms did not

invest a large amount of capital in fixed assets, as further recognised in Chapter 7. This might decrease the costs of production, enabling firms to generate profits in a short period of time. Thirdly, the firms that claimed making profits at start-up and early stages ignored owners' salary as labour costs. Furthermore, it illustrates that it would be complicated to define development stages of firms in practice by solely using profitability, as analysed in Chapter 5.

6.4.3 Heavy dependence on the domestic market

Table 6.16 provides a cross tabulation of the sample. It breaks exports into four categories: no exports; up to 9% of sales; between 10 and 49% of sales; and over 50% of sales. The table shows that 71% of the surveyed firms did not export at all. It demonstrates that high-tech SMEs in China are heavily dependant on the domestic market. Only 15% of the surveyed firms sold more than 50% of their sales turnover in international markets. On average 82% of total sales turnover in the sample originated from within the domestic market; and 18% from the international market. This suggests that high-tech SMEs in China are unlikely to sell a substantial proportion of their products or services in international markets or do not see a need to export.

Table 6.16 Distribution of businesses by export and province

	All	No export		Up to 9%		Between 10 and 49%		More than 50%	
	N	N	%	N	%	N	%	N	%
All	72	51	71	4	6	6	8	11	15
Guangdong	30	19	63	1	3	2	7	8	27
Guangxi	42	32	76	3	7	4	10	3	7

There are several reasons why high-tech SMEs in China have a heavy dependence on the domestic market. Firstly, due to the size of the Chinese population, there exists a vast domestic market for goods and services which is expanding because of rapid economic growth and a corresponding growth in market demand. Secondly, the products/services produced by Chinese high-tech SMEs have less competitive advantage over most international companies in relation to the quality of products and services, although it is in the process of changing. A lack of funds results in firms not being able to develop an original innovation and apply it to their products and services.

Thirdly, limited information about other markets and language barriers result in difficulties in entering an international market. Finally, the difficulties in obtaining export permission might also be an influencing factor. By the end of 1999, about 150 private firms had been granted direct export licenses (International Finance Cooperation; 2000). To obtain permission and be granted a licence, a firm must meet certain conditions: it must have registered capital, net assets of more than RMB 8.5 million Yuan, annual sales turnover of more than RMB 50 million, and the export value of more than RMB 1 million over the last two consecutive years. These conditions make it more difficult for high-tech SMEs to obtain a licence and then export to an international market. Some firms employ a marketing agent to overcome these barriers. An owner of an enterprise in Zhuhai producing electronic toys and learning products for children claimed that most total sales of the firm currently originate from the domestic market. As he explained,

“Actually, we programmed controlling/brain system of toys to top companies in this industry in the world. However, we have difficulties to export our products directly because we lack information and staff with good English. The solution to overcome the barriers is to recruit a new partner who is a Hongkong firm with experiences of marketing in international markets. We achieved 50% of sales turnover from the international market last year including the USA, France, Germany, and the UK”.

Table 6.16 indicates that there is a statistically significant difference between the two provinces in the percentage of firms exporting to an international market. The firms located in the coastal region were more likely to obtain a contract from an international market. This demonstrates that firms in Guangdong were more capable to compete with their counterparts over the international market than those in Guangxi. Geographical proximity to an international market and more mature private economy in Guangdong, compared to Guangxi, are the main reasons for this difference.

Two firms in the sample owned by Taiwanese owners in business solutions obtained all their contracts from the Taiwan market. Another firm located in Guilin that produced online games exported all its output to Malaysia because the Chinese government does not allow internet games being sold within China. The other firms were selling only a proportion of their products and services in an international market. The business

solutions and electronic appliance firms focus mainly on the US, France, Germany, the UK, Malaysian, and Philippines markets, while bio-tech firms mainly export materials or semi-finished products to the US and Japan. Only 6% of the surveyed firms had become involved in an international market and most achieved only a small proportion of their sales turnover from exports. Most of the firms were mainly focused on the domestic market.

6.5 Conclusion

The emergence of dynamic high-tech SMEs was the most important result achieved by Deng Xiaopeng, following his speech of south tour in 1992 and the further reforms in China begun in the second half of 1990s, as noted in Chapter 3. The survey evidence reveals that the majority of the surveyed firms were established after 1992, although some of them had reached the later stage of development by the time of the survey in 2004/2005. It demonstrates that the policy for, and institutional environment of, the high-tech sector is characterised by a push towards the development of high-tech SMEs. On the one hand, the research findings that the majority of owners were young and came from previous backgrounds associated with a high level of education and skills, illustrate that an improved institutional environment has had positive effects on encouraging potential entrepreneurs to set up their businesses in a high-tech sector. Increasing recognition of the benefits of involvement in the private enterprises from the mid 1990s has led to potential entrepreneurs overcoming their doubts and fears that was observed in the first decade after China's 'reform and opening'. On the other hand, the fact that state owned institutions lost their advantages in offering benefits to their staff has increasingly pushed potential entrepreneurs to leave and establish their own businesses.

An effective team of well educated and highly qualified owners, with valuable backgrounds associated with a high level of working experience in R&D and business management, is a key advantage to many entrepreneurs wishing to form firms. The majority of the surveyed firms had their sales turnover coming predominately from the domestic market, suggesting that there are various real or perceived barriers to becoming involved in foreign markets. It has been found that there is a gap in the level of business development between the two study provinces. The average size of firms in

Guangdong was twice as large as those in Guangxi, and Guangdong firms were more capable of being involved in both domestic market and an international market, in contrast with some Guangxi firms relying mainly on a local market. This chapter has also found that the average duration was only 8 months in the start-up stage, 22 months in the early stage, implying that high-tech SMEs might not be able to raise sufficient funds for investing in R&D and innovation. In the following chapter we turn to consider the financial needs of high-tech SMEs.

Chapter 7: Financing and the Alternative Methods

7.1 Introduction

Having in the previous chapter examined the distinctive characteristics of high-tech SMEs including stage, age, size, management characteristics, and growth, this chapter attempts to address the overall research question of what financial sources were actually sought and used by high-tech SMEs in relation to all three stages of business development. A key factor for successfully developing high-tech SMEs is the availability of sufficient funds to invest in R&D and innovation. The ability of high-tech SMEs to access financial sources is the most important influential factor for developing core competitiveness. However, the reforms of the banking sector have been much delayed, which has led to imbalances between private enterprises and the banking system. The purpose of this chapter is to discuss the survey evidence relating to the sources of finance used by high-tech SMEs, distinguishing between the stages of business development, and making comparisons between the two study provinces and the two study sectors. The links between the principal characteristics of high-tech SMEs and the availability of financial sources help in understanding the business strategies pursued by high-tech SMEs and their competitiveness in the markets.

The following section focuses on how high-tech SMEs meet their financial needs in relation to different stages of their development. Section 3 analyses the trends to access external finance with maturity. Section 4 presents the alternative methods used by high-tech SMEs to remove financial constraints and compete with their counterparts in the markets. The importance of the informal financial sources is addressed in section 5.

7.2 Access finance

The survey evidence reveals that the ease of accessing external finance in high-tech SMEs varies significantly through the development stages of firms. The start-up and the early stage firms were generally constrained from raising external finance, but mature firms were able to draw from a wider range of financial sources. It is clear that self-finance, retained earnings, and individual finance remain the mainstay of high-tech SME financing at all stages of their development in China. In contrast, bank loans and public venture capital play a limited role in supporting start-up and early stage firms, and even some later stage firms. This thesis identifies that there is a financial gap for medium and long term funds in high-tech SMEs and SMEs in general according to the survey evidence. The ease of access to external sources of finance in high-tech SMEs also varied between geographical provinces and between industrial sectors. These are to do with widening gaps in growth and development of regional economies as well as the characteristics of sectors e.g. entry barriers, the level of competition within the industry, and the level of profit margins.

7.2.1 Access finance at start-up

Table 7.1 reveals that at start-up, 97% of surveyed firms relied heavily on self-finance including founders' savings, borrowings from family and friends, and cash flow generated in other businesses owned by the same owners. It demonstrates that self-finance is a dominant source of finance to start up a high-tech SME in China. This can be illustrated by quotes from some of the interviewed owners:

An owner of a bio-tech firm in Guilin said that: *"I bought the bio-tech firm from the Guilin branch of the Industry and Commercial Bank where I used to work as a general manager. The initial capital was from my savings that was earned through investing in the stock market in China in the early 1990s"*.

An owner of an EIT firm in Zhuhai stated that *"I invested my savings of RMB 4 million to establish this business in 2003. The initial capital has been accumulated from my previous business/project. This was the second time I had set up my own business"*.

These cases suggest that some founders had sufficient savings to be able to invest a large amount of finance as initial capital to set up a high-tech business after the late 1990s.

Table 7.1 shows that only 8% of the surveyed firms obtained a bank loan as initial capital in the start-up stage. The evidence also reveals that those firms initially funded by bank finance were in the start-up stage during the period from the middle 1980s to the early 1990s. Also, they were jointly established by a group of individuals and a state owned institution e.g. local government, research institute, university, and were registered in the form of state owned firms or collectives. In other words, none of the young firms that were newly established after the late 1990s successfully obtained a bank loan. The question raised here is why the current role of the banking sector in supporting the start-up firms was weakened, compared with prior to the early 1990s. The key factor here is that the transformation of the banking sector from state owned to public ownership led to different sets of contractual arrangements being adopted to guide bank loans. The contractual arrangements adopted to secure bank finance used to be ownership structure, personal network, and extra benefits to staff in local branches before the middle 1990s. Some 8% of all surveyed firms including 4 firms established before 1992 and 2 firms established between 1992 and 1999 satisfied the requirements and successfully obtained one. However, the arrangements adopted by local branches to secure bank finance have been altered so that only estate (i.e. land and buildings belong to the firm or individuals) have been accepted as security since the late 1990s. As a consequence, none of the surveyed young firms that were in the start-up stage during the period from the late 1990s to the present gained one. It demonstrates that the availability of bank loans to high-tech SMEs depends upon the contractual arrangements adopted by local branches to guide the finance.

A senior manager of loan division in the Guilin branch of the Industry and Commercial Bank claimed: *"the criteria that were utilised to make loan decision have been changed completely over the past few years. We used to be active in serving enterprises and local authorities by providing loans because of a good relationship between us. Another key factor is that nobody in local branches was required to take responsibility for a new non-performance loan generated before 1997"*.

The case above indicates that loan decision making within the banking system relied upon established social networks, contributing to a large proportion of non-performance loans being generated before the middle of the 1990s. Thus new macro-financial policies and regulations were introduced by the national government to change the way of making loan decision. However, staff in local branches lost interest in serving enterprises after the late 1990s because of the conflicts between the new policies and their attitudes and habits towards lending, referred to in Chapter 4.

The funds from individual investors and private firms became a major source of finance to start up a high-tech business. Table 7.1 shows that at the start-up stage of development, 25% of the surveyed firms received funds from these private sources, compared to only 8% receiving bank loans. It suggests that informal investors had a closer relationship with high-tech SMEs than the banks. The key factor is that informal investors were more flexible in negotiating formal and informal contractual arrangements with high-tech SMEs by which loan suitability was made. For instance, informal arrangements including personal knowledge, trust, and reputation of business owners were extensively adopted by individuals to guide finance. An owner of an EIT firm in Shenzhen stated:

"I left a large state owned company and set up my own business in 1993. My first contract signed was a deal of RMB 1.3 million, which required working capital funds of RMB 700,000. The only possible way to raise this fund was to borrow from a university classmate of mine who has run his business for a couple of years. The security of the loan of RMB 700, 000 yuan was the document of the contract signed by a credible buyer and the trust between us. The incentive for the lender was to offer a significant proportion of the profits. Now I am quite happy to support friends of mine who need investment capital even without a written agreement".

This case suggests that potential individual investors rely more on informal contractual arrangements to guide exchanges with high-tech SMEs.

Some 37% of the surveyed firms obtained government grants or loans at the start-up stage but in these cases it was a small amount of grant capital to cover the rental of

offices or workshops. Only 3% of the firms gained start-up funds from business angels who knew founders quite well. None of the enterprises in the sample obtained the support from an initial public offering (IPO). This is not surprising because the public venture capital market has yet to function properly in China.

Only 5% of the surveyed firms obtained initial capital from their supervisory agents e.g. universities, state owned research institutes, and local government particularly at the county level; among these, one firm located in Nanning was still jointly owned by a state owned institute and a group of individuals. However, initial capital from the supervisory agents used to be a dominant source of finance to start up a high-tech business in the 1980s, as recognised in Chapter 3. It reflects that the trends to obtain sources of initial capital have moved away from supervisory agents to founder teams. On the one hand, this is because state owned institutes were not allowed to offer state owned resources to small firms after the late 1990s because of the law of preventing state owned institutions having affiliated firms. On the other hand, the founder teams themselves have accumulated a significant amount of savings, and could enjoy independently running their own businesses.

Table 7.1 The sources of finance actually used at the start up stage by province and sector

	All		Guangdong		Guangxi		EIT		Bio-tech	
Financial sources	No.	%	No.	%	No.	%	No.	%	No.	%
All	74		32		41		56		18	
Self-finance	72	97	31	97	41	98	55	98	17	94
Bank loans	6	8	3	9	3	7	3	5	3	17
Funds from individual investors	13	18	7	22	6	14	6	11**	7	39
Funds from private firms	5	7	4	13*	1	2	4	7	1	6
Funds from state owned firms	4	5	3	9	1	2	1	2**	3	17
Government grant/loans	27	37	11	34	16	38	18	32	9	50
Leasing/hire purchase	14	19	9	28*	5	12	11	20	3	17
Private equity	2	3	2	6	0	0	0	0**	2	11

Asterisks in the first column of a row group indicate statistically significant differences between two regions based on non-parametric tests; (**=significant at the 5% level or better, *=significant at the 10% level or better)

Table 7.2 The sources of finance actually used at the start up by province (EIT firms only)

Sources	Guangdong		Guangxi		All	
	No.	%	No.	%	No.	%
All	25		31		56	
Self-finance	24	96	31	100	55	98
Bank loans	1	4	2	7	3	5
Funds from individual investors	4	16	2	7	6	11
Funds from state owned firms	1	4	0	0	1	2
Government grant/loans	7	28	11	36	18	32
Leasing/hire purchase	8	32	3	10	11	20

Non-parametric testing has been conducted to test if there are statistically significant differences in obtaining each financial source during the start-up stage between high-tech SMEs in the two study provinces. The results show a similarity in the proportion of firms using self-funds, but statistically significant differences in obtaining funds from informal suppliers between start-up high-tech SMEs in the two provinces. As indicated in Table 7.3, 22% and 13% of the surveyed firms in the start-up stage successfully obtained funds from individual investors and private firms respectively in Guangdong, compared with only 14% and 2% respectively in Guangxi. About 6% of the surveyed firms in Guangdong obtained funds from private equity sources, compared to none in Guangxi. It indicates that initial capital from private investors is an important source for Guangdong firms than those in Guangxi. This implies that informal investors in Guangdong had more funds to invest and were knowledgeable in managing and securing their investments in some high-tech SMEs. It reflects the existence of regional disparities in the growth and development of the private sector as well as accumulated personal wealth between the coastal and the western regions. Guangxi firms that had personal contact with Guangdong were able to obtain informal funds from Guangdong. This argument is also both supported and illustrated by the following statement of the interviewed owners.

From an owner of an EIT firm in Guilin, *“the idea for setting up my own business was from a classmate of mine in the university who is quite successful in running his trading business in Shenzhen. He asked me as to whether I was interested in producing the products for him. He also actively offered me the initial capital for establishing my own business if I like”*.

This case suggests that business owners in Guangdong have sufficient funds and are willing to invest in other businesses through cooperating with their former colleagues.

A senior manager of a bio-tech firm in Shenzhen claimed: *“original founder of the firm who was a professor in a key university in China established his business in developing a new drug with a few of his research students when he retired in the early 1990s. Government agencies helped the firm in its start-up stage receiving large amounts of equity from both private and state owned sources by using their linkage with potential*

investors in Guangdong. The firm has thus survived and expanded rapidly and became a leading firm with 210 employees in the market”.

In contrast, the owner of a bio-tech firm in Guilin producing the same drug said: *“original founder that was the Guilin Branch of the Industry and Commercial Bank established the firm by buying the patent from a state owned research institute in Beijing in the early 1990s. Then I (who was the banker in the Guilin branch) bought the firm from the local branch a few years later in the middle 1990s. I was suffering from the shortage of investment capital, and had to decrease the number of staff in R&D division. In order to overcome financial constraints, I had to sell the land that I bought to gain reasonable size of cash for covering the expenses. In addition, the way of going through the difficult situation was to pay much more attention on marketing the products. Although having successfully gained bank finance for once by providing my own building, I was rejected for the second application by the same local branch”.* The firm has decreased its employment from 96 to 62 in 2003 because of the shortage of working capital.

These cases illustrate one way in which the availability of funds from various sources is greater to Guangdong firms in the start-up stage of development than those in Guangxi. It also suggests that the ability of Guangxi firms to conduct R&D and innovation is poorer than that in Guangdong in terms of sufficient funds received. It is not surprising that Guangdong firms are more active in the market and are developed faster. Thus it can be concluded that regional differences in development of high-tech SMEs existed and is growing because of the regional disparity in available sources of finance.

It might be expected that there would be a difference in financial sources used between the EIT and bio-tech sectors, as noted in Chapter 5. Table 7.1 confirms that bio-tech firms draw from a wider range of financial sources than EIT firms and differ significantly in their use of bank loans, funds from individual investors, government loan/grant, and HP/leasing finance. It suggests that both formal and informal investors prefer to lend to and invest in bio-tech firms than EIT firms. The key factor for this is a higher level of return on the investments once a bio-tech firm become established in the market. A high level of entry barriers as a result of the need to obtain permission to produce and market bio-tech products and services limited the level of competition.

Two owners of bio-tech manufacturers in Shenzhen and Guilin explained how difficult it proved to obtain permission:

“Applying for permission to produce and sell a new medicine in the market took several years and cost a lot of money. Firstly, firms needed to provide positive results of testing with a certain number of animal sample, then obtaining permission from the authorities at national level to continue the testing with human beings. Secondly, firms had to cooperate with medical doctors in hospitals and carry on a testing with a certain number of patients. Thirdly, positive results of testing with a significant number of human beings were submitted to the authorities. The firms finally got permission in production and marketing of the new medicine, but several years have been passed and a large amount of investment funds have already been spent”.

This case indicates that a high entry barrier within the bio-tech sector proved attractive to potential investors who were looking for a long term return on their investments, in particular public investment funds e.g. public listed companies.

Interviewees were asked what proportion of their finance was obtained from each source at the start-up stage. Table 7.3 reveals that an average of 84% of initial capital consisted of personal finance or savings introduced by principal owners, the start-up teams and their family. Only 3% of initial capital was from bank loans; 2% from government grants/loans; and 1% from private venture capital. Some 10% of initial capital was from other sources including individual investors, supervisory agencies, and private firms. Among these, 3 surveyed firms in Guangxi employed a private firm for the purpose of business registration. The employed firm just deposited registered capital of RMB 1 million Yuan in a bank for obtaining a business license from the local authority and charged a fee within an agreement. This reflects that first the minimum registered capital of RMB 1million required by the authority is too much for gaining the license and second, firms did not need this amount of initial capital to start up their businesses in practice. It indicates that the minimum registered capital requirement increases the size of initial capital needed and places a barrier to start up a high-tech business. This supports a previous finding that registered capital requirements for a private limited company in China are among the highest in the world (IFC, 2000).

Across the two provinces, there is no significant difference in the mean percentage of initial capital obtained from founders and the banks. Table 7.3 reveals that none of the surveyed firms in Guangxi received venture capital from private equity compared to an average 3% in Guangdong. It reflects that individual investors prefer to provide loans than equity to the start-ups, which suggests individual investors tend to be risk averse under the less certain institutional environment. In addition, there was a significant difference in the average percentage of initial capital obtained from government grants or loans between the two provinces. The possible explanation is that average amount of total initial capital for Guangdong firms was larger than that in Guangxi, the average percentage from government funds in total initial capital would therefore be smaller in Guangdong. As several owners in Guangdong claimed: *“the government grant received is too small, compared to the initial capital invested”*. This finding is consistent with the fact that the average size of the firms in Guangdong was larger than that in Guangxi (see Chapter 6).

Table 7.3 Structure of initial capital by province and sector (%)

Initial capital	All (74)	Province		Sector	
		Guangdong (32)	Guangxi (42)	EIT (56)	Bio-tech (18)
Self-finance	84	83	85	87	76
Bank loans	3	2	3	3	3
Government sources	2	0*	3	2	2
Private Venture capital	1	3	0	0*	6
Others	10	11	9	8	14

Others includes: individual loan, leasing/hire purchase, funds from state owned institutions
Asterisks in the first column of a row group indicate statistically significant differences between two regions based on the independent sample tests; **=significant at the 5% level or better, *=significant at the 10% level or better)

Across the two study sectors, the table reveals that the mean percentage of initial capital from external sources including public and private funds was larger for firms in bio-tech sector than that for the EIT sector. This is because bio-tech firms were perceived to generate a higher level of return once permission for production and marketing were gained, as recognised in the previous section.

7.2.2 Access to finance at the early stage

Based on Table 7.4, the survey evidence indicates that self-finance and retained earnings were key sources of finance for the 65 firms that had reached at least the early stage of development. About 99% of them had invested self-finance, and 92% re-invested retained earnings. Some 4 surveyed firms did not use retained earnings because they had yet to receive the payments. Some 52 % of the surveyed firms had obtained a government grant that was RMB 150, 000 Yuan in Guangdong and RMB 100, 000 Yuan in Guangxi; in addition to this grant, 2 firms obtained RMB millions of free interest loans from the central government. Only 15% of the firms successfully obtained bank loans, indicating that bank loans were not a major source during the early stage of development. In total, 61% of the surveyed firms obtained funds from private sources including 23% from individual investors, 15% from private firms, 18% from internal staff and 5% from business angels. Therefore, it appears that high-tech SMEs had more success in cooperating with private sources than with the banking sector and the financial market.

The main reason given by a number of interviewed owners/senior managers who could be both borrowers and lenders can be illustrated by the following statement: *“we (owners and individual suppliers) knew each other and understand our businesses for many years in detail, for instance, the value of properties we had and the school (private or public) our child goes to. The assessments of loan applications could be based on personal information obtained when formal arrangements were not available. In addition, a protection of our reputation in the community really was an informal arrangement to secure short-term finance”*.

These cases illustrate that individual investors took into account a wider range of formal and informal contractual arrangements i.e. personal knowledge about owners to assess the level of risks associated with loans, compared to the banks. This built up a better relationship between the firms and informal suppliers. Hence individual investors have become considerably sophisticated in their loan decision making and play an important role in supporting SMEs in the market. An interesting question raised here is whether or not the banking sector can improve its relationship with high-tech SMEs through

adopting the same contractual arrangements as informal investors do. This will be addressed in the next chapter.

Are there any significant differences between Guangdong and Guangxi in the financial sources used by the early stage firms? As shown in Table 7.4, there is no difference in financial sources used from self-finance, retained earnings and government grants or loans between the two provinces. Also there are no significant differences in the proportion of the surveyed firms that obtained funds from individual investors and private firms. However, an interesting finding is that the amount of available funds from each lender varies since it is larger in Guangdong than in Guangxi. This argument is supported and illustrated by the following statement from the interviewed owners:

An owner of a firm in developing software packages in Nanning said: *"we (business owner team) have been raising working capital from our friends and family, but only a small amount of funds is available from each lender in Guangxi. Thus a large amount of funds needed must be divided into several small portions and borrowed from several lenders. But I knew that it is not difficult to obtain a large amount of funds from one lender in Guangdong"*.

A number of Guangxi firms claimed that *"they borrowed a large amount of working capital or obtained private equity for project finance from their business suppliers or their social networks in coastal provinces such as Beijing and Guangdong"*. These cases reflect that Guangxi firms needing a large amount of investment capital were not able to raise it from the local business community. In contrast, a number of Guangdong firms said that *"there was no problem to raise one million Yuan and even more of working capital from a friend in a few days notice"*. An owner of a firm in Guangdong stated that *"a friend of mine who is running his business that is similar with my business in Shenzhen always offer me millions Yuan of short term loans at the same rate of interest as bank finance. I also lend investment capital to friends of mine when they need it"*.

All these cases first suggest that owners in Guangdong firms are close within the business community, and also act as financial suppliers to support each other. They are more able to secure and manage their investments in some businesses where they

understand and are confident to judge risk and return of businesses, and offer funds at attractive or acceptable costs. This may in return lead to an increasing demand for a significant amount of finance in Guangdong firms because of the low costs of finance. However, Guangxi firms that had no contact with coastal provinces suffer from raising a significant size of investment capital or have to pay a higher level of interest for receiving informal finance.

One major difference shown in Table 7.4 is that 32% of the surveyed firms in Guangdong obtained funds from internal staff compared to just 8% in Guangxi (statistically significant at the 5% level). Funds from firms' employees are mainly in the form of medium and long-term finance, relating to a fact that firms in Guangdong were more profitable and are able to offer an attractive return for the investment of their employees (see Chapter 6). This is also to do with that internal staff of Guangdong firms have a larger amount of savings that can be invested in businesses because of the higher wage /income levels. Financially integrating with firm's employees became a useful approach to meet medium and long-term financial needs in Guangdong, although the majority of the surveyed firms have difficulties to raise them.

Furthermore, Table 7.4 shows that 21% of the surveyed firms in the early stage of development obtained bank finance in Guangdong, compared to only 11% in Guangxi. An interesting finding is that some Guangdong firms that received bank finance used their employees' estate properties to secure the loans. For example, a firm that produces communication equipments in Zhuhai successfully obtained RMB millions Yuan three times between 2000 and 2003 for its business expansion through providing 20 apartment properties owned by its senior staff. Using employees' estate as security thus leads to a greater success to obtain bank finance in Guangdong firms in the early stage of development. However, the survey evidence indicates that none of Guangxi firms obtained bank finance by using employees' estate. It is worth noting that there is no difference in adopting contractual arrangements to secure finance by local branches between the two provinces.

Across the two sectors, Table 7.4 shows that early stage bio-tech firms used a wider range of financial sources than their EIT counterparts and differ significantly in their use of bank loans, government grants and loans, investment funds from state-owned

firms, funds from individual investors, private firms, internal staff, and private equity. It reveals that bio-tech firms had a greater ability to access external sources of finance than EIT firms. It suggests that individual investors prefer to lend to or invest in bio-tech firms than EIT firms at the early stage, as already analysed in relation to the start-up stage (see section 7.2.1).

Before discussing the purposes of fundraising, it is necessary to explore the size and term of informal finance since they were the major sources from external investors to high-tech SMEs. The majority of interviewed owners/senior managers in the two provinces claimed, *“the money borrowed from individuals was essentially used to meet short-term needs, usually several days up to a maximum of a few months. We don't seek medium and long term of funds from individuals because of either a higher interest rates or unavailability”*.

These cases illustrate that funds from individual investors and private small firms were for small amounts and short term from several days to a few months. This suggests there is a lack of medium and long term finance from individual investors for the early stage firms. In other words, high-tech firms experience a shortage of medium and long-term funds, relating to not being able to develop technology and achieve core competitiveness. What causes this financial gap for medium and long term funds in high-tech SMEs? As recognised in the earlier sections, informal investors rely more on informal arrangements e.g. personal knowledge, trust, and risk of investments to secure their funds. This limits their ability to resolve possible disputes because of the difficulties of enforcing penalties through informal arrangements. In addition, the less stable institutional environment leads to owners and informal financial suppliers being reluctant to invest in a medium and long term project, as discussed in Chapter 4.

Table 7.4 Financial sources actually used at the early stage by province and sector

Financial sources	All		Guangdong		Guangxi		EIT		Bio-tech	
	No.	%	No.	%	No.	%	No.	%	No.	%
All	65		28		37		50		15	
Self-finance	65	100	28	100	37	100	48	96	15	100
Retained earnings	61	92	26	93	35	92	47	94	14	93
Bank loans	10	15	6	21	4	11	4	8**	6	38
Funds from individual investors	15	23	6	21	9	23	10	20	6	38
Funds from private firms	10	15	2	7	8	21	6	12	4	25
Funds from state owned firms	4	6	1	4	3	8	2	4	2	13
Internal staff	12	18	9	32**	3	8	6	12**	6	38
Government grants/loans	26	52	7	54	19	51	22	44*	12	75
Leasing/hire purchase	5	8	1	4	4	11	5	10	1	6
Credit terms	9	17	4	21	5	15	7	14	3	20
Private equity	3	5	1	4	2	5	1	2*	2	13

Asterisks in the first column of a row group indicate statistically significant differences between two regions based on non-parametric tests; (**=significant at the 5% level or better, *=significant at the 10% level or better)

Table 7.5 The purposes of raising external funds by province at the early stage

	Working capital			Acquiring fixed assets		Project finance		Other purpose	
	All	No.	%	No.	%	No.	%	No.	%
All	65	62	93	25	37	4	20	3	5
Guangdong	28	27	93	18	62**	9	31*	1	3
Guangxi	37	35	92	7	18	5	13	2	5

Asterisks in the second row of a column group indicate statistically significant differences between two regions based on Chi-square tests; (**=significant at the 5% level or better, *=significant at the 10% level or better)

An owner of an EIT firm producing online games in Guilin claimed: *“I do not want to borrow money from banks and friends to develop the games even if I can. It is difficult to control the lead time of products launched onto the market. I don’t want to worry about repayment all the time. I prefer to decrease the costs of operating expenses. For instance, 2 staff and I have no salary until a sales turnover generated. I may have to move out the current office when the contract for the office expires in a situation where the products of the games are still not ready to launch”*.

The case above suggests that some owners are cautious to seek and use external sources of finance since they are not confident in the repayment later on. This implies that some owners who have the expertise to develop their products lack the skills to manage their finance.

The purposes of raising external finance are highlighted in Table 7.5. It reveals that 93% of the surveyed firms in the early stage of development raised external funds to meet needs of working capital, 37% for acquiring fixed assets, 20% for project finance, and 5% for other purposes. It appears that the most important purpose of fundraising was to cover expenses of working capital. This is consistent with the previous finding that there is a lack of medium and long term funds, as shown by the finding that fundraising for conducting R&D was rare within the sample. Firms that invest a large amount of funds in R&D are less attractive to private investors as they tend to be less profitable than those that apply existing technology to offer products and services at low costs under the current market circumstances.

Comparing the two provinces, there are significant variations between Guangdong and Guangxi in terms of fundraising for the purposes of acquiring fixed assets and project finance. As shown in Table 7.5, 62% and 31% of the surveyed firms in Guangdong raised funds for these purposes respectively, compared to only 18% and 13% in Guangxi. It suggests that firms in Guangxi were more constrained in obtain medium and long term funds, as already discussed in relation to comparisons of financing across the two study provinces.

7.2.3 Access to finance at the later stage

The survey evidence indicates that self-finance and retained earnings are still key sources of finance at the later stage. Table 7.6 indicates that all the 39 firms that had reached this stage met their financial needs through self-finance and retained earnings, although not entirely or completely. Some 41% of them successfully obtained bank loans at the later stage and provided various forms of security, such as the firm's building/ land or individuals' houses/ properties or High Technology Guarantee Company. High Technology Guarantee Company has been specially set up by provincial and local government for the purpose of providing security for bank finance to high-tech SMEs. An EIT firm in Zhuhai continued to provide more than 20 house properties that were owned by its senior employees to act as collateral in order to obtain a bank loan of RMB 3 million. Some 3 firms that provided collateral by High Technology Guarantee Company were offered a bank loan but refused it because the costs of capital were higher than what they could afford. Some 49% of the surveyed firms obtained a government grant of RMB 150, 000 Yuan in Guangdong and RMB 100,000 Yuan in Guangxi; in addition to this grant, 2 firms in Guangdong received RMB millions Yuan of government loans. The survey evidence shows that 36% of them obtained short term funds from individual investors and 6% obtained private equity. Furthermore, about 31% of them raised funds from their employees. It therefore indicates that funds from informal sources of finance including individual investors, internal staff, and private firms remained the dominant sources even when firms reached the later stage of development.

The later stage firms did not generally find short term finance to be a constraint, but requiring a large amount of medium and long term finance continued to be a problem. In addition, it was still difficult for the later stage firms to obtain bank loans without owning land, building, and house properties. Some 59% of them were not able to obtain a bank loan because they could not provide estate properties required by the banks to secure a loan. As recognised above (see section 7.2.1), accepting only estate properties to secure bank finance led to the inability of high-tech SMEs to access finance from the banking sector. Another influencing factor is that there is a lack of trust and understanding between firms and financial intermediaries in China. This is supported by

the fact that a bank payment certificate offered by a Chinese bank was not accepted as collateral, whereas those from overseas banks were accepted as security.

An owner of an EIT manufacturing firm in Shenzhen described the financial problems he was experiencing at the later stage of development:

“In 2000, a test of a new product’s stability and safety was being conducted, a large amount of investment for project finance was needed. However, I failed to gain a bank loan although I have applied for one. This is because I had no estate properties to be provided as security for a bank loan. My staff did not get payment for three months until receiving funds from several friends of mine. Today it would not be a problem for me to successfully gain bank loans because I bought a building. However, I don’t need it now since sufficient cash flow has been generating. The retained earnings and credit from my suppliers can significantly meet the needs of finance”.

Table 7.6 Financial sources actually used at the later stage by province and sector

Financial sources	All		Guangdong		Guangxi		EIT		Bio-tech	
	No.	%	No.	%	No.	%	No.	%	No.	%
All	39		21		18		31		8	
Self-finance	39	100	21	100	18	100	31	100	8	100
Retained earnings	39	100	21	100	18	100	29	97	8	100
Bank loans	16	41	10	50	6	32	13	43	4	44
Funds from individual / private firms	14	36	8	40	6	32	21	70	5	55
Funds from state firms	1	3	1	5	0	0	0	0	1	11
Internal staff	11	31	9	48	2	12	10	36	2	25
Government grant/loans	19	49	6	30*	13	68	13	43	6	67
Leasing/hire purchase	-	-	-	-	-	-	-	-	-	-
Credit terms	9	30	7	50	2	13	10	40	0	0
Private equity	2	6	1	6	1	7	0	0	3	43
Listed in stock market	2	6	2	10	0	0	1	3	1	11

Asterisks in the first column of a row group indicate statistically significant differences between two regions based on non-parametric tests; (**=significant at the 5% level or better, *=significant at the 10% level or better)

Some 41% of the later stage firms received bank loans, compared with 36% that received loans from individual investors. This implies that firms are more likely to use bank loans than individual funds if both are available. There are several reasons for this. Firstly, bank loans are traditional and formal sources of finance for businesses and rely more on formal arrangements to be secured. The advantage of this for firms is a greater ability to resolve disputes. Secondly, there is a need to build up a credit and corporate relationship between firms and the banks under the current business environments. As a number of owners claimed, *“one of the reasons for borrowing money from the banks was to help credit officers in local branches to achieve their targeting aims as it would be important to improve the relationship between us”*. Thirdly, due to a lack of formal legislations to protect private investments, a very short term of informal finance results in less competitiveness in the financial market. Finally, some informal suppliers asked a higher interest, contributing to a move away from them to bank finance.

The survey evidence reveals that public venture capital was not a major source of funds to firms in the later stage of development. Only 2 later stage firms had successfully listed in the Chinese stock market by acquisition activities. The main reasons given by interviewed owners/senior managers include firstly the costs of preparing to be listed in the Chinese stock market which are very high, leading to high-tech SMEs being unable to afford it. Secondly, the threshold of listing is very high, making it difficult for a high-tech SME to qualify. As a consequence, the majority of high-tech SMEs could not raise funds from public venture capital in China because of the high costs and hardly achievable requirements of listing.

The survey evidence reveals that later stage firms in Guangdong draw from a wider range of financial sources than those in Guangxi, and differ in their use of bank finance, funds from their employees, and government finance. Table 7.6 shows that 50% of the later stage firms in Guangdong successfully gained bank loans, compared to only 32% in Guangxi. It demonstrates that firms in Guangdong had more success in accessing bank loans than those in Guangxi. An explanation was given by a bank officer in Guilin branch of the Industry and Commercial Bank:

“Local branches in Guangdong have priorities to gain a larger amount of funds that would offer to firms as bank loans because the regional branch of the banks located in Guangzhou that is the capital city in Guangdong province. There are more national controlled banks being set up in Guangdong rather than in Guangxi. The total amounts of funds from banks available in Guangdong therefore are larger than that in Guangxi”.

There therefore appear to be regional differences in the support offered by the banks to the firms in the later stage of development, which resulted from financial policies and regulations introduced by the central government relating to quota of bank loans.

There is a difference (although not statistically significant) in obtaining funds from internal staff of the surveyed firms between the two provinces. Table 7.6 shows that 48% of later stage firms in Guangdong used funds from their internal staff as a key source of finance, compared to only 12% in Guangxi. It indicates that as found during the early stage, firms in Guangdong were more capable of raising medium and long term funds from their employees, compared with those in Guangxi.

In addition, there is a significant difference in obtaining government grants and loans between the two provinces as well (statistically significant at the 10%). Table 7.6 shows that 30% of the surveyed firms in the later stage in Guangdong were successful in obtaining government grants or loans, compared to a higher proportion of 68% in Guangxi. It reveals that the later stage firms in Guangxi relied more heavily on the support provided by government than those in Guangdong. This implies that firms in Guangxi still have difficulties to meet their financial needs from internal and external funds even they are in the later stage of development. Moreover, it reflects that the government in Guangxi tends to support high-tech firms that demonstrated better performance and profitability. It implies that firms that were financially constrained had difficulties in gaining a government grant/loan. This argument is supported by the statement from a senior manager of an EIT firm in Guilin:

“An officer in a district government came to us and keenly offered a grant of RMB 150,000 Yuan annually for three years to set up a doctoral research station in our firm. In addition, he asked us to apply for a government loan of RMB 1million Yuan because

they had to achieve a targeted aim of allocating a certain size of loans. Actually, we didn't really need external sources of finance since retained earnings were sufficient".

The case above suggests that the government grants and loans were allocated to firms with relatively little need for them, in contrast the firms experiencing financial constraints might not be able to gain one from the provincial government.

Across the two study sectors, there is no significant difference in later stage firms use of external sources of finance apart from private equity between bio-tech and EIT firms. Bio-tech firms continually had more success in fundraising from private venture capital than those in the EIT sector. It suggests that banks and individual investors do not prefer to provide funds to mature bio-tech firms; but private venture capitalists remained more likely to invest in bio-tech than the EIT sector.

7.3 The trend to access external finance with maturity

The analyses above confirm that the ease of gaining access to finance in high-tech SMEs varies significantly through the development stages of firms. It is important to distinguish the variety of financing between all three stages of development. Firms would have a greater ability to obtain finance from a wider range of internal and external sources as they mature. In contrast, the firms in the start-up and the early stages of development appear to suffer the most. The following section explores the trend to access external finance with maturity.

Bank loans

According to the survey evidence, the proportion of firms receiving bank loans increased from 8% at the start-up stage to 15% at the early stage, and 41% at the later stage. Bank loans become a major source of investment funds when firms mature. The trend to access bank finance with maturity is consistent with the previous findings that focused on financing of high-tech SMEs in mature market systems such as the UK (Bank of England, 2000). However, the differences are that the support from banks to high-tech SMEs is more limited in China than in the UK in relation to various stages of development. Bank loans will not be available to high-tech SMEs in China until they

are able to provide real estate properties as collateral. This will be discussed in the next chapter.

Government grants and loans

The likelihood of obtaining government grants/loans also appears to increase once a firm has got through the start-up stage, from 37% at start-up to 52% at early stage, and 49% at the later stage. The size of government grants and loans also tends to increase as a firm matures. From only covering the rental of an office in an initial stage it tends to increase to hundred of thousands Yuan at the early and the later stages of development. However, the government grants might not be used for their intended purpose i.e. investment of R&D and innovation in some cases. Moreover, only 2 firms with better performance within the sample successfully obtained one, although the government loans could amount to millions of Yuan to the early and the later stage firms.

Informal market

Funds from individual investors have been a major source to high-tech SMEs at all stages of their development. This reflects that individual finance is available to all stages of high-tech SMEs since individual lenders are likely to negotiate the collateral with the potential borrowers. The key difference between the banking sector and individual investors is that they adopt varying formal and informal institutional arrangements to secure finance. Individual investors who are looking for a return tend to be more flexible and would take into account a wider range of factors i.e. personal knowledge of the business owners to make a loan decision. In contrast, the banks have been focusing on reforming their own internal system and reducing the amount of non-performance loans, thus have been reluctant to provide funds in recent years. In addition to individual finance, fundraising from internal staff presents a major source in the early and the later stages of development. The findings therefore demonstrate that informal financial suppliers have built up a better relationship with high-tech SMEs and been largely substituting for the banking sector.

Apart from the funds from their employees, the distinctive characteristic of individual funds is that they tend to be for small amounts and short-term. From the lenders'

perspective, the short maturities and small size reduces the risk of default. From the borrowers' perspective, the increased transaction costs that consist of a higher level of interest and expenses on social networks discourage SMEs from raising more medium and long terms funds from the informal market. Therefore informal funds from private sources remain the most important for SME to meet only their working capital needs. The survey evidence shows that a few of firms producing and trading medical testing and treatment equipments in Nanning obtained a large amount of working capital funds from the same company located in Beijing. This suggests that individual investors are likely to provide funds to specific businesses where they understand the businesses well and are confident to judge the risk and return of projects. This also suggests that market demands for finance drive the investment capital flow from coastal provinces to western provinces.

Public equity

At the start-up and the early stages of development, none of the surveyed firms obtained funds from public venture capital. Only 2 later stage firms raised public venture capital from the stock exchange including one firm in EIT through the acquisition of another firm; and another in bio-tech benefiting from receiving government support regularly in the form of grant and loan for a couple of years. This indicates that the public venture capital plays a limited role in supporting high-tech SMEs, particularly during the start-up and the early stages of development. This is mainly caused by a policy deficiency between second board exchange and high-tech SMEs. Although the Shenzhen Second Board Market (SSBM) specialising in providing public funds to new high-tech SMEs was launched in the market in 2003, SSBM requires minimum trading record, minimum assets, and profits level. This restricts the ability of high-tech SMEs to access public venture capital. As a number of owners/senior managers interviewed claimed, *"it seems to be difficult for new high-tech firms to meet these requirements i.e. a minimum trading record of RMB 4 million"*.

7.4 The alternative methods used

The findings above demonstrate that high-tech SMEs are financially constrained particularly at start-up and during the early stage. They have difficulties in accessing

bank finance because of the deficiencies in contractual arrangements that exist between banks and high-tech SMEs in the Chinese financial market. High-tech SMEs are also in a difficult position with regard to fundraising from the public venture capital market. Thus the alternative methods have extensively been used by high-tech SMEs to overcome the financial constraints that they face.

The interviewed owners/senior managers of high-tech firms were asked what alternative methods they have employed at various stages of the firm's development. Their answers are classified into five categories: the most frequently employed method is outsourcing and is followed by decreasing labour costs, employing surplus plant and equipment, employing a market agent, and gaining support from other businesses.

Table 7.10 shows that the alternative methods have commonly been used by the surveyed firms at all three stages of development to overcome financial constraints or pursue cost reduction; 70% at the start-up stage used at least one alternative method, 70% at the early stage, and 73% at the later stage. Furthermore, 23% of the surveyed firms in the start-up stage employed at least two alternative methods, 15% at the early stage, and 10% at the later stage. An interesting finding is that the surveyed firms continue to rely heavily on the alternative methods to meet their financial needs during the later stage of their development. In addition, the later stage firms are likely to employ surplus plant and equipment owned by former state owned firms at an attractive price. These research findings imply that a strategy of cost reduction has extensively been adopted by the surveyed firms. Moreover, they are reluctant to invest in fixed assets or long-term projects even if they can afford it. This illustrates the previous finding that there is a financial gap for medium and long-term funds in high-tech SMEs. It also demonstrates that owners of SMEs and their financial suppliers are less likely to invest in medium and long-term projects until a stable business environment has been established, as referred to in Chapter 4. This argument is illustrated by the statement of an owner of an EIT manufacturer located in Guilin:

"It was not necessary to establish a company with a large size of initial funds. My business was founded with RMB 10,000 Yuan of initial capital in 2000. We have not invested in fixed assets even at the later stage, just signed contracts with former large state-owned manufacturer that had workshop, equipment and skilled labour. R&D was

outsourced to senior researchers or professors in the university where I used to work for many years. Retained earnings provide sufficient funds which meet the financial needs at the later stage". The researcher who was in China in June 2006 has met the owner and been told that: *"I just bought the using right of 15 acres land for 50 years, and is building my plant but without borrowing external finance at all".*

This case reveals that high-tech SMEs in China were likely to adopt the alternative methods and avoid a large amount of medium and long-term investment on R&D and innovation. One of the reasons for doing this is that existing resources formerly owned by state owned firms are lying idle. It also shows that the owners of high-tech SMEs are cautious to accept external sources of finance because of a consideration of capital costs.

Table 7.10 reveals that a higher proportion of the surveyed firms at all three stages of development in Guangxi employed an alternative method than that in Guangdong, particularly the later stage firms (87% in Guangxi, 57% in Guangdong). In addition, a higher proportion of the start-ups employed at least two alternative methods in Guangxi than in Guangdong. This indicates that most firms in Guangxi were more reliant on the alternative methods, even when they were becoming mature. This result supports the previous finding that the financial environment for business is better in Guangdong than in Guangxi because of regional disparities in economic growth and development and levels of personal wealth.

Another interesting finding is that firms in Guangxi are more likely to employ a market agent to sell their products than those in Guangdong during the later stage of development. In doing so they have accepted that a significant proportion of the profits are offered to the market agent as part of the agreement. It suggests that Guangxi firms find it more difficult to introduce their products and services to new customers in either the domestic or an international market, not least because of the financial problems in setting up distribution channels covering a wider geographical area.

In addition, about 5 early stage firms and 2 later stage firms in Guangxi gained financial support from other businesses owned by the same owners. It reflects a fact that early stage firms in Guangxi rely more on self-finance to meet financial needs of business

expansion; even they might not be able to generate sufficient profits to invest in developing new products or new markets during the later stage of development.

An owner of a business solution firm in Nanning claimed: *“we have been operating a business in computer trading and after sales services since 1995. The cash flow generated from the business is now reinvested in a new firm that established in 2000 specialising in developing software package. Without supporting from the trading business, we were not sure how long the new firm survives”*.

The case above implies that more and more SMEs in general have moved to the high-tech sector by taking advantages of preferential measures offered by government at different levels in China.

Table 7.10 The alternative methods used by stage and province

Alternative methods	Start-up						Early stage						Later stage					
	All		Guangdong		Guangxi		All		Guangdong		Guangxi		All		Guangdong		Guangxi	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
All	74	70	32	66	42	74	66	70	28	57	38	79	30	73	14	57	16	87
A	19	26	6	19	13	31	34	52	14	50	20	53	13	43	7	50	6	38
B	13	18	7	22	6	14	4	6	1	4	3	8	1	3	0	0	1	6
C	12	16	7	22	5	12	2	3	1	4	1	3	2	7	1	7	1	6
D	2	3	0	0	2	5	1	2	0	0	1	3	4	13	0	0	4	25
E	6	8	1	3	5	11	5	8	0	0	5	13	2	7	0	0	2	13

Notes: A=outsourcing, B=decreasing labour costs, C=using surplus plant and equipment, D=employing a marketing agent,

E=supporting from other business

Table 7.11 The alternative methods used by business activities at the early and the later stages

	All	Manufacture		Business solution		Research institution		Other services	
	No.	No.	%	No.	%	No.	%	No.	%
Early stage									
All	44	24		15		2		3	
Outsourcing/deposits charged	33	19	79	10	67	2	100	2	67
Decreasing labour costs	3	1	4	2	13	0	0	0	0
Employing surplus equipment/plant	2	2	8	0	0	0	0	0	0
Employing a market agent	1	0	0	1	7	0	0	0	0
Supporting from other business	5	2	8	2	13	0	0	1	33
Later stage									
All	21	15		5		1		0	
Outsourcing/deposits charged	11	7		4		0		0	
Decreasing labour costs	2	1		0		1		0	
Employing surplus equipment/plant	2	2		0		0		0	
Employing a market agent	4	4		0		0		0	
Supporting from other business	2	1		1		0		0	

Table 7.11 also reveals the alternative methods used by the surveyed firms conducting different types of business activity during the early and the later stages of development. The majority of the manufacturers in the sample have not invested in fixed assets for the purpose of production, as indicated in the earlier section. They contracted out much of their manufacture to other companies that have surplus workshop and equipment. Thus high-tech manufactures focus more on gaining contracts, developing products, and providing after-sales services rather than production. In contrast, non-manufactures including business solution firms, research institutes, and other services firms usually do not need a large amount of investment capital in purchasing expensive fixed assets, and mainly covered their operating expenses by charging deposits from their customers once a contract had been signed.

7.5 The importance of the informal relationship

As demonstrated earlier in this chapter (section 7.2), funds from individual investors and private firms, as well as firms' employees, remained the key sources of finance to firms at all stages of their development, with bank finance and venture capital yet to become significant sources particularly at start-up and early stages. It appears that informal financial suppliers have built up a close relationship with high-tech SMEs and have been largely substituting for formal financial suppliers i.e. the banking sector. In other words, currently informal suppliers play a more important role in supporting high-tech SMEs than formal suppliers in the Chinese financial market. This is consistent with the argument that Chinese SMEs in general depend mainly upon financial support from informal sources such as owners' family and friends and to a lesser extent on formal sources such as financial institutions. Informal sources of loan finance have become a central aspect of the financial infrastructure for small businesses in China. The purpose of this section is to consider further the reasons behind the importance of informal finance for high-tech firms and how this relationship is influenced by demand side influences as well as supply side ones. In particular, it considers the attractions of informal financial sources from the perspective of high-tech firms themselves.

The surveyed firms in both the coastal and western regions found informal sources more appropriate to meet their financial needs compared with formal sources in a situation

where external funds are required. The question raised here is what led to firms being interested in obtaining funds from informal sources, which were typically small amounts and for short periods from several days up to a maximum of a few months. As stated previously, the most frequent reason for requiring external funds was to meet the short-term need for working capital. The majority of high-tech SMEs did not intend to raise and use medium and long-term finance in order to invest in either the R&D necessary for developing new and distinctive products at the start-up stage or expensive fixed assets for improving production at subsequent stages. This suggests that the majority of high-tech SMEs were not interested in developing and producing new and distinctive products with a relative long life span which would require seeking out sources of medium or long term finance. In other words, it may be interpreted as indicating a certain lack of 'investment readiness' for long-term finance on the part of high-tech firms in China at the present time. The strategy that the majority of the surveyed firms adopted to compete with other high-tech companies was to promptly respond to market demands and to offer needed products and services at attractive prices. This suggests that there is no intention of seeking and using long-term finance, particularly during the start-up and early stages of development. It also demonstrates that the majority of high-tech SMEs are not readily using long-term of external finance for the purposes of achieving core competitiveness. The development of high-tech SMEs in China has yet to reach the stage where attention is focused upon long-term projects and competitiveness based on long-term strategic planning. This is illustrated and supported by the following quote from an interviewed owner:

An owner of an EIT firm in Shenzhen claimed: the most important thing for companies to be successful is to satisfy market demands, increase market shares, and make profits as soon as possible rather than to invest a large amount of capital in developing new products. It would be difficult for firms that invested a large amount of initial capital in R&D and innovation at start-up stage to survive and grow. A friend of mine who was based in the US returned back to China and set up a high-tech business in Shanghai in 2003. His proposed business plan was to develop distinctive technology and apply it to products. However, he closed down his business within two years since he was not familiar with Chinese business environments.

This case illustrates that, from the perspective of an SME owner, long-term external funds are not appropriate to a strategy based on products that have a short life span. It also indicates that those small technology-based firms that do invest sufficient initial capital in developing new and distinctive products are then likely to be at a competitive disadvantage because of the lead-in time required to develop new products and the higher costs of R&D and innovation. As the example shows, there is also a fear that the business would fail before new products are successfully developed and launched in the market. The survey findings therefore indicate a lack of confidence currently amongst Chinese high-tech SMEs in investing in long-term product development. For these reasons, short-term informal financial sources are considered by most Chinese high-tech SMEs to be more appropriate to their needs, using existing social networks and developing relationships based on mutual trust and understanding with informal investors.

The survey evidence from some mature firms also supports the argument that there is a lack of 'investment readiness' for long-term finance on the part of Chinese high-tech SMEs. A number of interviewed owners whose businesses were quite successful in terms of their performance and profitability said: *the reason for applying for a bank loan was to build up a relationship with the bank in the local branch as the credit officers encouraged firms to borrow it. However, the bank loan was then deposited in a local branch to prepare for coping with a possible urgent need.* This suggests that bank finance is used by some better performing firms as short-term source of working capital, although bank finance should be for fixed terms of no less than half a year. From a cost perspective of short-term funding, bank loans are unlikely to be a suitable source compared to informal sources, yet some firms are encouraged by the banks themselves to take them even though they do not really need them. It appears that whilst firms at the later stage are not ready to use longer-term funding from more formal sources for investment purposes, some of them nevertheless see the value of accepting loans in order to build up a relationship with financial institutions.

Another influence on the heavy reliance on short-term informal finance is that a strategy of cost reduction has been adopted widely by high-tech SMEs, leading to a concern with the costs of raising external finance. Many surveyed firms never considered raising external funds for a period longer than half a year because of concerns about the higher

costs of medium and long-term finance. Bank finance is usually only available for a fixed-term of no less than a year, making it an inappropriate source of finance to meet financial needs of small technology-based firms. These cost considerations are therefore another reason why high-tech SMEs are not prepared to raise and use medium and long-term external finance, placing a further serious barrier on the ability of high-tech SMEs to engage in R&D for making more fundamental innovations.

7.6 Conclusion

This chapter distinguishes the ease of gaining access to finance in high-tech SMEs between all three stages of their development. The firms have more difficulty in accessing external finance during the start-up and early stages of development, thus they depend heavily on self-finance, retained earnings, and the alternative methods. Although the firms are able to draw from a wider range of financial sources during the later stage of development, they continued to rely on informal sources and self-financing e.g. fundraising from their employees, retained earnings, and the alternative methods. Traditional bank loans and venture capital have yet to become key sources to support high-tech SMEs, but self-financing, re-investment of retained earnings, and individual finance remain major sources and have largely been substituting formal sources of finance for all stages of high-tech firm's development. The important features of informal funds are that they are more appropriate to meet financial needs of high-tech SMEs, and tend to be for a small amount and short-term according to the survey evidence. Thus this thesis clearly identifies a gap for medium and long term finance in high-tech SMEs. The surveyed firms at all three stages of development made common use of practices such as reducing operating costs, contracting out/in production to/from other companies, employing surplus equipment and plant, and reducing labour costs. Also, the firms tend to seek niches where the required size of investment funds is small and could be met by self-finance and employing the alternative methods. The main focuses of high-tech SMEs are on application of existing either advanced technology or technology to products and services, reduction of production costs, and serving the domestic market. The selected businesses are mainly manufacturers in production of differentiated products and services, business solution, research institutes, and other services.

Comparing the two study provinces, there is a disparity in the availability of funds and the average size of informal finance to the firms in all three stages of development between the two provinces, even though there is no significant variation in financial sources used from self-finance and retained earnings between them. The firms in Guangdong are more capable of obtaining sufficient funds from individual investors and their employees than those in Guangxi. The amount of finance from private sources on average is larger in Guangdong than in Guangxi. Guangdong firms are also more successful in obtaining bank finance during the later stage of development since they manage to provide their employees' estate properties as collateral. This supports the conclusion that firms are at different levels of business development between the two provinces in terms of their employment size and their ability to be involved in both domestic and international market (see Chapter 6). Across the two sectors, all three stages of firms in bio-tech sector draw from a wider range of financial sources, and significantly differ in their use of bank finance, government grants and loans, funds from informal investors and state owned firms. It seems that the bio-tech sector is more attractive to financial suppliers because it tends to be more profitable.

Due to a gap for medium and long term finance, it appears that high-tech SMEs have difficulties in conducting the R&D necessary to make radical distinctive innovations. Also, the owners of high-tech SMEs are cautious to invest in a medium and long-term project under the less stable business environment. Thus utilising existing either advanced technology or technology to offer value-added products and services at an attractive price in the domestic market has become crucial to compete with the counterparts in the market currently. However, this approach is likely to face challenges in further growth and development of the high-tech sector because of a lack of sufficient investments in the R&D necessary to develop core competitiveness. In the next chapter, we focus on the relationships between high-tech SMEs and financial suppliers.

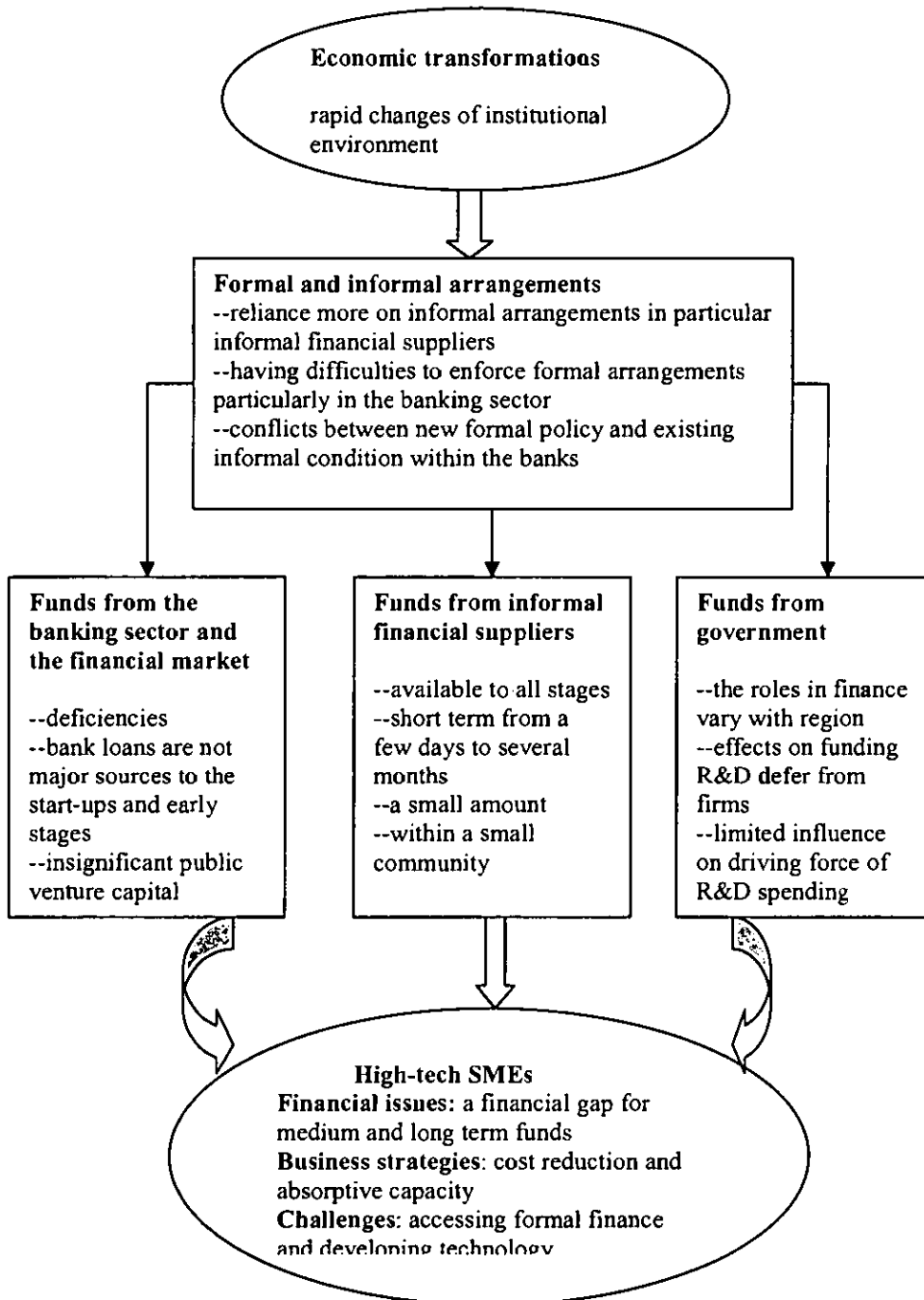
Chapter 8 The Role of Institutions in Finance

8.1 Introduction

Having in the previous chapter identified the availability of external finance for high-tech SMEs in relation to the three stages of their development, this chapter attempts to address the role of institutions in relationships between high-tech SMEs and financial suppliers. It interprets the findings of primary research including the interviews with bank and government officials as well as the surveys of high-tech SMEs from an institutional perspective. One of the key factors for successfully obtaining sufficient finance, developing original technology, and achieving core competitiveness is the selection of formal and informal contractual arrangements with respect to funds security. Figure 8.1 provides the framework for this chapter, making the links between the institutional environments and financial issues, and distinguishing their impacts on high-tech SMEs behaviour. The purpose of this chapter is to discuss formal and informal contractual arrangements used by three main financial suppliers in their relationships with high-tech SMEs. A conducive environment for lending to high-tech SMEs is crucial to make sufficient funds in particular medium and long-term investment capital available for R&D and innovation, and to create technology-based ventures.

The following section first explores the deficiencies in the market for finance between high-tech SMEs and the banking sector. Section 3 discusses the more advanced relationship between high-tech SMEs and informal suppliers of finance and section 4 focuses on the role of government in funding high-tech SMEs.

Figure 8.1 The role of institutions in finance



8.2 The deficiencies between high-tech SMEs and the banks

The survey evidence from both interviewed owners/senior managers of high-tech SMEs and bank managers/credit officers in local branches suggests that there are deficiencies in the market for finance between high-tech SMEs and the banking system. The following discussion of the current poor relationship between the banks and high-tech SMEs looks at five aspects: demand for bank loans, collateral guarantee, inefficient procedure of application, information problems, and institutional deficiencies.

8.2.1 Demand for bank loans

As shown in Chapter 7, only a small proportion of firms at the start-up and the early stages obtained bank loans and even at the later stage only 41% had obtained them. This indicates that the support offered by the banks is very limited when starting and developing a high-tech business in China. In order to explore why bank loans were not a major source of finance to high-tech SMEs, interviewed owners/senior managers were asked if they had ever applied for a bank loan and if so, whether they were successful in obtaining one. Table 8.1 shows that only 12% of the firms at start-up stage had made a loan application, 29% at the early stage, and 46% at the later stage. Interestingly, however, the success rates for the applications were high: 67% at start-up, 53% at the early stage, and 90% at the later stage. It indicates that there is a process of self-selection in deciding whether or not to apply for a bank loan. The majority of the surveyed firms during the start-up and the early stages perceived that they would not be successful in obtaining bank finance. As many interviewed owners/senior managers in both the provinces stated: *"the banks would not lend me money, thus it was not worth applying for one"*. This statement implies that bank loans were perceived by most owners/managers to be unavailable to high-tech SMEs. They were not encouraged to make use of bank finance based on the contractual arrangements adopted currently by staff in local branches. In addition, one possible implication is that there are potential high-tech businesses which never start because they can't obtain bank finance and they do not have sufficient internal finance.

Table 8.1 The success rate for loan applications by stage and province

	All No.	Applied No.	%	Obtained No.	%	Success rate %
All						
Start-up	74	9	12	6	8	67
Early stage	65	19	29	10	15	53
Later stage	39	18	46	16	41	90
Start-up						
Guangdong	32	3	9	3	9	100
Guangxi	42	6	14	3	7	50
Early stage						
Guangdong	28	8	28	6	21	75
Guangxi	37	11	29	4	11	36
Later stage						
Guangdong	21	11	55	10	50	91
Guangxi	18	7	37	6	32	86

The question raised here is why bank finance was perceived by most owners/senior managers to be unavailable at the start-up, the early stage, and even the later stage. Interviewed owners/senior managers were asked what collateral was required to provide for securities of bank finance. The answer given by interviewed owners/senior managers and bank managers is that acceptable collateral for securing a bank loan had to be mainly in the form of estate properties since the late 1990s, which led to most firms concluding that they would be unable to meet the requirements. There is a saying within the surveyed firms: *“the banks would not offer you a loan until you don't really need it”*. This is also illustrated by the quote from two interviewed owners/senior managers:

An owner of an EIT firm in Guilin claimed: *“the reason that we applied for a bank loan and accepted the offer in 2003 was to build up a relationship with the bank in the local branch as the credit officers asked us to borrow it. In fact, we don't need it because our firm has been generating sufficient cash flow”*.

An owner of an EIT firm producing electronic toys in Zhuhai claimed: *“we don't need bank finance because we have been making reasonable profits. In addition, our suppliers are likely to offer credit terms as our reputation has been built up. Our*

distributors should pay a deposit once we sign a contract because our products and services have competitive advantages in the domestic market. The main reason for applying for a bank loan is to prepare for coping with a possible emergent need”.

These cases suggest that firms that really need bank finance don't apply as they think they would not obtain one, in contrast with firms that have a little need were allocated one. It reflects that staff in local branches have little interest in taking risk and sharing the rewards of providing finance to high-tech SMEs. This is also the reason why formal arrangements e.g. contracts signed by creditable buyers and patents were not accepted by staff in local branches to secure the finance.

Table 8.1 shows that those firms that applied in the early stage had a lower success rate (53%), than those in the start-up and the later stages. Firms at the start-up could reduce the size of initial capital they required to overcome financial constraints through developing products and services and contacting initial customers prior to the formation of the firms. However, firms in the early stage had to invest in working capital including buying materials and operating expenses, but it was unlikely to be met by bank finance. The table also reveals that a higher proportion of firms in the later stage applied for bank finance and had a higher level of success, which is consistent with a previous finding that mature firms had a greater ability to access bank loans.

There is a gap in the success rate for loan applications at all stages between the two provinces. Table 8.1 shows that the success rates were 100%, 75% and 91% at start-up, early stage and later stage in Guangdong, compared with 50%, 36%, and 86% in Guangxi. It indicates that a higher proportion of firms in Guangdong successfully obtained bank finance than in Guangxi. As noted in Chapter 6, a larger proportion of Guangdong firms were established before the second half of the 1990s and it was easier for firms to obtain bank finance before the policies changed from the late 1990s. This indicates that the development of high-tech SMEs in the western provinces has been particularly disadvantaged by the change of the policy. In addition, it may reflect that commercial banks in Guangdong have more funds to be allocated to high-tech SMEs. It also reflects the fact that the economic and business environment between the two provinces is at different level of market development because the private sector is better developed in Guangdong than in Guangxi.

A bank manager in the Guilin branch of the Industry and Commercial Bank claimed: *“state owned commercial banks started to implement strict criteria on loan decision making since 2000 e.g. in practice only land or building properties are accepted as collateral for a bank loan. During the period from 1992 to 2000, it was possible for firms to obtain a bank loan as long as it benefited the bank’s staff, or they had a special relationship with the banks, even if they could not provide security e.g. land or building property”*.

The case above indicates that bank finance was more readily available before the late 1990s since the institutional arrangements to guide finance became more unfavourable to high-tech SMEs in particular and SMEs in general subsequently.

8.2.2 Collateral and guarantees

In cases where firms did not apply for a loan, the interviewed owners/senior managers were asked why they were deterred from applying for bank finance. The main reasons for this are shown in Table 8.2. The most frequently given reason for not applying was a lack of security, being identified by 76% at the start up, 82% at the early stage, and 36% at the later stage. Interviewed owners/senior managers claimed that the only collateral accepted by the banks was mainly in the form of estate properties, although the banks are supposed to accept other forms of collateral i.e. cashable saving instruments, equipment, and contracts signed by credible buyers. It reveals that the inability of high-tech SMEs to provide collateral is the most frequent reason for not being able to obtain a bank loan. This suggests that there are failures on understanding between the banking sector and high-tech SMEs.

The second most frequently mentioned reason is that they have no need of bank finance, identified by 12% at the start-up, 15% at the early stage, and 60% at the later stage. Some 8 start-ups claimed that they did not need bank loans because personal capital could meet their financial needs and 8 firms at the early stage explained that the retained earnings were sufficient to meet their financial needs entirely. In addition to these 8 cases, the firms providing business services e.g. business solution would start to receive customers’ payments once the contracts were signed. Thus many firms that claimed

they had no need of bank finance were confident that they could cover their operating expenses entirely by retained earnings and credit terms. Although 36% of the later stage firms still had difficulties in providing sufficient collateral to secure a loan, 60% claimed that they had no need of bank finance. This supports the findings that firms in the later stage of development are more able to rely on retained earnings and the support offered by their employees to meet their financial needs. It also suggests that about a third of high-tech SMEs could benefit from bank finance but they are not prepared to apply for one because of a perceived inability to meet the banks security requirements.

An owner of an EIT firm in Zhuhai developing Chinese word processing of software said: *"I invested all my saving of RMB 200, 000 Yuan and my partner offered a patent awarded to set up our business. In the first three months, we could not afford salaries of all 7 employees, only provided lunch for them. It was so hard to employ staff without paying salary. I knew that it was impossible to obtain bank loans and public equity because I could not provide the collateral required. For the purpose of fundraising, we had to recruit 3 new partners through offering partnership when we gained the certification by passing GBT 18031. However, I am now having problems in cooperating with new partners since we have different views on business strategies adopted"*.

The case illustrates one way in which intangible properties were not accepted by local branches to obtain bank finance. In contrast, individual investors were likely to consider intangible properties to assess the risk and return of projects. In addition, it also indicates that the owners of high-tech SMEs are reluctant to offer partnership since it may result in the conflicts between founders and new partners relating to future business strategies, as recognised in Chapter 2.

The table shows that 4 firms at the start-up rejected to accept a bank offer. Among these firms, 3 start-ups that provided collateral via a High Technology Guarantee Company could not afford the cost of capital, and another one worried about its ability to do the repayment according to an agreement between the firm and the bank later on. This indicates that the costs of investment capital can influence the decision as to whether or not to accept external funds. In addition, concerns whether or not the banks are able to

provide the required amount and term of funds are another reason for not applying for one, as shown in Table 8.2.

Table 8.2 The main reasons for not using bank loans by stages of development

	Start-up		Early stage		Later stage	
	No	%	No.	%	No.	%
All	68		55		22	
Lack of security	50	76	45	82	8	36
No need	8	12	8	15	13	60
Fail to meet the amount and term required	4	6	1	2	1	4
Refusing to receive bank loans	4	6	0	0	0	0

Table 8.3 The collateral provided for obtaining a bank loan by stages of development

Collateral	Start up		Early stage		Later stage	
	No.	%	No.	%	No.	%
Firm's building/land	0	0	5	50	11	64
Individual houses	1	17	1	10	3	17
Contract/project	0	0	0	0	1	5
Guarantee Company	4	67	4	40	2	10
Other	1	17	0	0	1	5
Total	6	100	10	100	17	100

In cases where firms actually used a bank loan, the interviewed owners/senior managers were asked what collateral they were required to provide for loan applications. The major collateral provided by the surveyed firms was their estate properties i.e. building, land, and houses owned by the owners and their internal staff. Table 8.3 shows that 4 firms that were established before the second half of the 1990s secured bank loans for the start-up by their supervisory agencies as a guarantee company. Some 6 firms provided their estate properties and 4 firms employed a guarantee company as collateral during the early stage of businesses development. It is not surprising that a higher proportion of the firms in the later stage provided building/land or individual houses to secure a loan. Only one firm in the later stage provided credit certification offered by a foreign bank as security for bank finance, but the interviewed owner of this firm in Shenzhen claimed: "I was rejected once when applying a bank loan since the

certifications that I provided produced by the Chinese banks were not accepted as collateral". This suggests that local branches may not trust the certification offered by other branches or other banks.

Taken as a whole, the results suggest that estate properties including building, land, and houses were mainly accepted as collateral by the banking sector. However, it appears to be difficult for the firms in the start-up and the early stages of development to meet these requirements. The available formal securities for loan applications within the firms are mainly in the form of contracts signed by credible buyers, working capital (e.g. material stock), intangible properties (e.g. a patent), and credit certification offered by banks. The question raised here is why local branches do not accept what high-tech SMEs are able to offer as formal contractual arrangements to guide bank finance. Before answering this question, it is necessary to explore the following survey evidence.

A general manager in a Guilin branch of the Industry and Commercial Bank was asked how the banks generated cash flow to cover operating expenses without making profits from lending. He claimed: *"We generated sales turnover through depositing in the Central Bank; the interests offered by the Central Bank could entirely cover operating expenses including the rental and labour costs. In addition, we have reduced labour costs through decreasing the amount of bonus and the number of employees. We have no incentive to make profits through lending because we might lose our positions if a new non-performance loan was created in recent years. Lending to private firms is mainly influenced by a policy called 'responsibility to individuals'".*

The case above reflects the unenthusiastic attitude of staff in local branches towards this policy since they began to have little interest in taking on the risk of lending and sharing the rewards. It indicates that the changes of habits and attitudes of staff towards lending lag behind the changes in formal rules and regulations.

The interviewed bank managers were asked about the possibility of high-tech SMEs successfully obtaining a bank loan under the current financial environment. Their responses indicated that it is almost impossible for high-tech SMEs to successfully obtain a loan without owning estate properties including building, land, and a house.

A credit officer of the Industry and Commercial Bank in Guilin described his experiences: *"I have investigated a high-tech firm in Guilin for a couple of years. I knew the owner quite well and believed that the business would be successful in the market if the firm could obtain a bank loan. However, our manager refused to provide a loan because the firm could not provide estate properties to secure it"*.

The case above is a further illustration of the fact that banks only accept building, houses and land as collaterals since the policies and regulations relating to the banks have been changed, as noted in Chapter 4. It indicates that bank managers may be risk averse because of the fear of their job security.

A firm operating in the EIT sector in Guilin that applied for bank loans three times in 5 years between 2000 and 2004 claimed: *"we applied for a bank loan with collateral provided by a High Technology Guarantee Company in 2000. However, the Guilin Branch of the Bank of China rejected the application because we had no land/building property to secure the loan. In 2003, we successfully obtained a bank loan of RMB 3.5 million as we just about bought a building. However, in 2004, we failed to obtain a bank loan of RMB 2 million again. The reason for not offering a loan given by the Guilin Branch of the Bank of China is that they are preparing to list on the stock market"*.

This case gives one of the main reasons why local branches are reluctant to support high-tech SMEs and SMEs in general, particularly in the period of their transformation from a state owned to a listed banking sector.

8.2.3 Inefficient procedure of application

According to the survey evidence, the procedure of loan applications is very bureaucratic and costly. For instance, to accept an estate property as collateral involves a great deal of paperwork not only with the bank, but also with many other departments i.e. the office of notary public, the asset evaluation agency, and government agencies. It could take several months to complete the documentation and costs a lot of money. Furthermore, although 41% of firms successfully obtained bank loans by providing land/building and house properties or a High-technology Guarantee Company as

security during the later stage of development, bank loans were not an appropriate source to meet the immediate financial needs of high-tech SMEs because of the long period of time needed to process loan applications. As an owner of an EIT company in Shenzhen explained:

"I successfully borrowed capital from banks since I offered my owned building as collateral. The bank loan was then deposited in a bank. The purpose for doing this was to prepare to meet urgent needs. It would be too late to apply for it once the contract was signed because of the delay in time to process the applications".

A number of interviewed owners/senior managers stressed: *"it is difficult /impossible to obtain bank loans when we need it. An owner of an EIT firm in Guilin said that I am more likely to borrow money from my sisters than banks in a situation where I could make sure that profits would be generated. This is because I can receive the money from my sisters within one day's notice. But I don't know how long it is going to be with banks".*

A senior manager in a later stage bio-tech firm in the High-tech Industry Park in Nanning claims: *"we are likely to paste a notice of fundraising in the public place within the Park i.e. parking place, rather than going through banks when we need funds urgently. We gained funds from firms or individuals within the Park quickly once the notice was published".*

These cases suggest that high-tech SMEs perceived that bank finance was not an appropriate source because of a long period of processing for applications. They prefer to make use of individual finance once they are able to be sure of the repayments.

The interviewed owners/senior managers were asked how satisfied they were with their current bank. None of interviewees was very satisfied with the current bank, most responses being neutral. One firm in Guilin claimed that we were very dissatisfied with our current bank. The main reason given for the dissatisfaction by interviewed owners/senior managers was that state-owned banks do not provide funds to serve firms properly and only play a role in transferring payment.

8.2.4 Information problems/financial disclosure

As recognised in Chapter 2, information asymmetry exists between SMEs and banks, contributing to the difficulties SMEs experience in obtaining a bank loan. However, information problems, which are generic to financial markets, are especially severe for SMEs in China. These involve several aspects. Firstly, small firms are especially cautious about revealing information to outsiders because of cultural factors, market forces, and business policies and regulations. For instance, the taxation system is a concern, which leads SMEs to underreport and misreport their financial position in reaction to regulatory constraints. Secondly, the banks are naturally reluctant to accept financial statements provided by SMEs to assess the risk and return of projects. Thirdly, the banks are less able to and lack the incentive to collect and process relevant information (see previous section), because of a lack of trust and understanding between the banks and small firms. Finally, the banks find it more difficult to evaluate technical projects and new products because of a lack of both experience of serving private enterprises and technical expertise, compared to those in developed countries.

The following statements of interviewed owners/senior managers support the arguments about the burden of taxation. A number of surveyed owners/senior managers stressed: *“we would not make profits if we paid taxes as much as we are required to base on the current tax regulations. Also we have not yet benefited from the taxes that have been paid”*.

An owner of an EIT firm in Shenzhen claimed: *“the reason that my firm moved to Shenzhen from Guilin was to avoid the burden of the tax system. There are a lot more firms in Shenzhen than in Guilin; the tax officers therefore might not be interested in inspecting small firms”*.

The cases above suggest that there is a need for improving the tax regulations to SMEs, in particular their enforcement in reality. Even though there is no difference in tax regulations relating to high-tech SMEs between the two provinces, the results of enforcing the same rule could be different between them. Furthermore, high-tech SMEs should improve the quality of the financial statements by employing transparent financial and accounting system. A credit relationship between banks and high-tech

SMEs and SMEs in general would be crucial to having a better level of cooperation between them.

Finally, on the supply side, a further factor affecting the availability of bank finance relates to the difficulties that bank staff face in assessing commercial projects, especially those involving technical knowhow. A number of empirical studies focusing on financing of high-tech SMEs in western countries such as the UK and the US have found that banks are reluctant to provide loans to high-tech SMEs at start-up especially for those conducting a radical innovation, referred to in Chapter 2. This relates to a fact that banks lack technical expertise and find it difficult to evaluate technical projects and new products. It appears that the banking sector in China has more difficulty in assessing loan applications and judging technical projects because of a lack of experience of serving private enterprises, compared to those in western countries. A result of limited ability of bank managers to assess technical projects is that they become more risk averse and have little interest in sharing the potential rewards of projects having a high level of both risk and expected return. Therefore, it is not surprising that staff in local branches have lost their interest in providing finance to high-tech SMEs as a whole. This is also a key factor that facilitates Chinese high-tech SMEs making use of informal sources of finance and constructing the informal relationship more important.

8.2.5 Institutional deficiencies

Having in the preceding sections from 8.2.1 to 8.2.4 analysed the surveyed data and discussed why the support to high-tech SMEs from the banking sector is limited, this section seeks to interpret the findings from an institutional perspective. It will argue that the limited support from the banking sector to high-tech SMEs is mainly the consequence of the institutional deficiencies between the arrangements required by the banks and the ability of firms to meet them, and the conflicts between new formal and existing informal arrangements.

The survey evidence from both high-tech SMEs and the banking sector has illustrated that only real estate properties were accepted by staff in local branches to secure bank finance in recent years in practice, although other formal arrangements e.g. contracts

signed by creditable customers, equipments, and patents suppose to be accepted as collateral according to the banks' regulations. It appears that asking for real estate properties makes local branches easier to sell it immediately to redeem bank loans when it is necessary. In contrast, staff in local branches found it more difficult to assess and deal with other collaterals for the security of bank finance because of a lack of trust and understanding between high-tech SMEs and the banking sector. However, high-tech SMEs in the start-up and the early stages of development are unlikely to have their own estate properties, contributing to the most difficulties in successfully obtaining and self-decisions of deterring from bank finance. This reflects a failure of contractual arrangements that are adopted by the banking sector to determine loan suitability. Also, it reflects the important role of staff interests in serving enterprises.

The current deficiencies for finance between high-tech SMEs and the banks also resulted from the macro-financial policies introduced by the national government to regulate further reforms of the banking sector. The main focus of the banking sector has been on reduction of the non-performance loans and preparation for listing in the stock markets since the second half of the 1990s. To achieve these goals, a policy called 'responsibility to individuals' has been introduced to the banking system from the late 1990s. Bank staff reacted to this policy by becoming reluctant to offer bank finance to enterprises. Little attention was therefore paid to serving high-tech SMEs. Originally, one of the purposes of introducing this policy was to ask staff in local branches to improve their ability to judge the risk and return on investment in enterprises. However, bank managers in local branches did not respond positively, paying less attention to assessing loan applications based on credit analysis. This demonstrates that impacts of macro-financial policies and regulations on privatisation of the banking sector and its provision of finance to high-tech SMEs are often contradictory, depending on responses of staff at the local level to the policy.

Furthermore, the current limited support from the banking sector to high-tech SMEs is the consequence of conflicts of new formal arrangements and the existing informal arrangements. The conflicts come from an inconsistent change between formal and informal institutions since informal constraints embodied in customs, traditions and codes of conduct are much more impervious to deliberate policies (North, 1990, Hodgson, 2000). In other words, the conflicts result from the gaps in properly

implementing the new institutional framework. The existing informal conditions discussed here are the attitudes and habits of staff towards lending to firms. Staff in local branches had frequently relied on relationships and their personal interests rather than credit analysis to determine loan suitability before the early 1990s. Thus these customs and practices had become informal conditions to assess loan suitability, creating many problems in the enforcement of bank loan contracts and contributing to a high level of default rates and a large proportion of non-performance loans. The delay of changes in these customs and practices leads to disincentives providing bank loans to high-tech SMEs and SMEs in general. The delay of changes in informal conditions also leads staff in the banking sector to neglect the ways in which some formal arrangements can secure bank finance particularly in the beginning of a policy's introduction. It illustrates that informal conditions e.g. the customs and practices are one of the key factors to lead to a poor relationship between high-tech SMEs and the banking sector. It is more difficult for the banking system to change the habits of staff towards serving high-tech SMEs than to introduce new policies. Therefore, one of the current priorities for the banking sector is to encourage its staff to recognise high-tech SMEs as potential market for a range of financial products.

8.3 The relationship between high-tech SMEs and informal suppliers

A lack of interest by the banking sector in serving high-tech SMEs has created new business opportunities for informal financial suppliers in the market. Informal financial suppliers in this study mainly are business owners who are operating their own high-tech businesses, public enterprises listed on a stock exchange market, and individual investors. The fact that funds from informal financial suppliers were major sources for high-tech SMEs in relation to all three stages of their development (see Chapter 7), demonstrates that informal suppliers have a close and more advanced relationship with high-tech SMEs. The following section discusses what contractual arrangements adopted by informal suppliers made individual finance more available to high-tech SMEs, although it tends to be for small amounts and short-term.

One of the key factors for a greater ability of high-tech SMEs to access informal finance is the way in which informal suppliers select formal and informal contractual arrangements to secure their funds. Informal suppliers are more flexible in negotiating

collateral with each firm, and are likely to accept varying contractual arrangements to secure their finance. The criteria by which the informal suppliers make loan decisions vary according to firms. It comprises both formal arrangements (e.g. contracts signed by creditable customers and owner's personal properties) and informal conditions (e.g. owner's reputation, relationship, and trust). The main reason why informal suppliers accept both formal and informal arrangements is that they are usually already knowledgeable about the businesses they are investing in. They are therefore able to judge risk and return of projects, and are confident in providing and managing their investments in high-tech firms.

Informal suppliers treat their borrowers differently. The requirements for loan security and costs of funds vary depending on their understanding of the businesses and knowledge of the owners. As discussed in Chapter 7, some informal suppliers are even prepared to rely solely on informal arrangements e.g. trust to provide working capital at the same rate of interest as the banks offer to firms in situations where they know the owners and understand the business well. In fact, owners of high-tech firms are likely to financially support each other within their business community particularly in the coastal provinces. But to new clients, they require formal arrangements and ask a higher level of interest when they do not know the business and the owners well. It suggests that understanding high-tech businesses is crucial in improving the ability of investors to assess loan suitability. This implies that informal suppliers are more likely to provide support to high-tech SMEs that are in their business networks and communities. It appears that firms, particularly at the start-up stage, that are not recognised in the community thus either have difficulties in obtaining informal finance or have to pay a higher interest.

A greater availability of privately financial sources to high-tech SMEs mainly results from adopting flexible contractual arrangements relating to informal suppliers having more knowledge in the invested businesses. In other words, informal suppliers are positively looking for the ways in which they make potential business opportunities to take place, and help resolve various development challenges. However, staff in the banking sector did not manage and employ flexible arrangements because of their inability to assess loan suitability and over-cautious of loan security, as discussed in the previous section. The key factor is that interaction of formal and informal arrangements

is convergent within informal investors, compared to the conflicts within the banking system. It suggests that encouraging staff to understand and serve high-tech SMEs is crucial to improve the relationship between high-tech SMEs and the banking sector.

As the present study has found, private sources of finance were short-term from a few days to several months. This can be interpreted from an institutional perspective. First, informal suppliers are often dependent on informal conditions to secure their investment in high-tech SMEs according to the survey evidence. For instance, they are even prepared to offer working capital to firms without having any written agreements. In this case, the security for the finance is the persons in responsible positions who would not like to be embarrassed by being known in their communities to be in financial difficulties. However, it appears that both lenders and borrowers have difficulties in resolving disputes of default in medium and long term finance because the lack of a formal, written contracts makes it difficult to enforce penalties (North, 1990). As discussed in Chapter 4, informal arrangements are enforced by normative and mimetic mechanisms. The penalties to default and cheating could be expulsion from the community, isolation by friends or neighbours, or loss of reputation. But it is unlikely for these informal suppliers to be able to turn to the law for protection because of the absence of written contracts. They thus have particular difficulties in managing medium and long term funds, although adopting informal conditions improves the relationship between high-tech SMEs and informal suppliers. Second, a higher interest asked by some informal investors to unfavourable clients leads to medium and long-term funds being unaffordable. Almost all owners in the sample never consider raising medium and long-term finance from individual investors. Third, both informal investors and owners of high-tech SMEs might not be confident in investing in medium and long-term projects because of the unstable business environments. This supports an argument that owners of firms chiefly focus on short-term business activities rather than strategy thinking during the period of the economic transition (Smallbone and Welter, 2004). It indicates that achieving a stable financial and business environment is one of the key factors to make medium and long-term finance available to high-tech SMEs.

8.4 The relationship of high-tech SMEs and government

Due to financial constraints that high-tech SMEs have especially for initial capital and R&D investments, a range of financial support to high-tech SMEs has been provided by the government. The relationship of high-tech SMEs and the government relates to the criteria used by which government funds would be allocated. The following section focuses on the three main schemes, and looks at their role in funding high-tech SMEs and their effects on driving R&D and innovation spending from an institutional perspective.

The first scheme discussed here is the Innovation Fund for Small Technology-based Firms. This is a national government special fund that was set up upon the approval of the State Council to support technology innovation. As a special fund of the central government, the Innovation Fund for Small Technology-based Firms has several aims, these being: (1) support the firms with various ownerships, (2) lure effectively investment from local governments, enterprises, venture capital firms and financial institutions, (3) promote gradually the establishment of investment mechanism for high and new technology industrialisation, (4) further optimize technology investment resources and build up an environment conducive to innovation and development of small technology-based firms.

The criteria by which the fund in the form of either grants or interest free loans would be given are the level of R&D and innovative being conducted by firms in China as a whole. The amount of the fund to each winner can reach to millions Yuan. Informal conditions e.g. personal contacts with government agencies are relatively less likely to influence fund allocations because it is more difficult to build up a social network within the country. The survey evidence shows that 2 firms in Guangdong successfully obtained the funds. This illustrates that the central government only support a small proportion of high-tech SMEs with technological advantages. The majority of high-tech SMEs that suffered from shortage of investment capital did not benefit from this support.

The Innovation Fund is primarily concentrating on the coastal region according to the surveyed evidence and the annual reports of the Innovation Fund for Small Technology-based Innovation in China (2003, 2004). Firms in Guangdong found it easier to meet the criteria and were in a better position to successfully obtain the support, compared to those in Guangxi. This relates to several aspects: first high-tech SMEs were better established in the coastal region than in western region. For instance, Guangdong firms were typically established in the early 1990s, compared with the late 1990s in Guangxi. Second, technological disparity between the coastal and interior provinces has been growing to the advantage of the coastal region (Jefferson, 2005). The coastal provinces, particularly the major cities of Beijing, Shanghai, and Guangzhou, have better technology environments and resources since they have leading universities and more state owned research institutes. Third, coastal provinces are more attractive to graduates starting and developing their high-tech businesses because of the more developed market-based system. This suggests that the criteria employed by the Innovation Funds for Small Technology-based Firms are in favor of coastal firms.

The second scheme noted here is the Three Project Funds of Science and Technology. This is a specific government fund at provincial level aimed at encouraging R&D of advanced technology and its application to products. As a provincial government fund, the scheme is funded by annual budgets of provincial government and managed by the Department of Science and Technology at provincial level. The criteria are mainly dependent upon the ranking of R&D within the province. The committees of experts that assess the level of R&D and innovation and make suggestions are organised by the Department of Science and Technology in the province once a year. The amount of the fund to each firm varies with provinces e.g. RMB 150,000 Yuan in Guangdong and RMB 100,000 Yuan in Guangxi. The survey evidence shows that a significant proportion of the surveyed firms have received the fund at least once in the two study provinces. Moreover, firms that had contacts with government agencies found it easier to access this support. This suggests that informal conditions e.g. owner's personal social network could influence the fund's allocation. In addition, the effects of the funds on supporting firms vary according to provinces. A fact that 68% of Guangxi firms at the later stage have received the fund, compared to only 30% in Guangdong, demonstrates that the fund are more crucial in supporting high-tech SMEs in Guangxi

than in Guangdong. This is to do with that more active and mature informal suppliers exist in coastal provinces.

The third scheme discussed here is called the Technology Incubator for young innovative firms aimed in principle at transforming scientific results to real productive force or promoting commercialisation of R&D and innovation. Most of the incubators are government owned and focus especially on start-up and early stage firms. They are jointly funded by governments at national, provincial, and city levels and are managed by government agencies within a high-tech park. The high-tech parks are able to give great support to incubators since many high-tech parks have well-built infrastructure. The incubators can therefore get access to the infrastructure easily in its initial period. The support offered by technology incubators to qualified young firms generally includes office or plant space free or at low cost for the first two or three years of their establishment and initial capital in the form of a grant, loan, and venture capital. The amount of the fund to qualified firms varies with incubators and the time of year, which relies on government annual budgets. Incubators also assist entrepreneurs in financing by making use of their linkages with government, banks, and other relevant institutions.

The criteria for qualifying young innovative firms for the scheme depend upon how much they satisfy provincial industrial policies. For instance, Guangxi government has decided to adjust its industrial structure through technology innovation. A 'software park' thus has been set up in Nanning and offered free office space and initial capital to firms that were running in this sector. In addition, the Technology Incubators in Guangxi also aim to attract more potential entrepreneurs to establish their high-tech businesses, and help to adjust its industrial structure. The institutional arrangements that are now applied to select firms therefore are the level of education of business owners and their previous working experiences. For instance, owners of high-tech firms who have attained a doctoral degree either in China or overseas, or who have attained at least a masters degree and worked in a relevant field overseas for three years are eligible to receive the support from the incubator. As a consequence, a higher proportion of academics who returned back from overseas and experts who attained a doctoral degree have set up their high-tech businesses in Guangxi than in Guangdong in recent years, as presented in Chapter 7. This suggests the criteria adopted in Guangxi increase the number of newly established high-tech firms. In contrast with Guangdong the

incubators are more likely to absorb young firms that have promising new products or technologies, and help them to expand rapidly. The criteria adopted by Guangdong to select firms are the approval of promising products. Within the surveyed sample, two firms (one producing a new drug in China and another producing a new disinfection product for restaurants and hotels) in Guangdong successfully obtained a significant size of venture capital from both government and private venture capital. This indicates that the institutional arrangements employed by provincial government are crucial to guide the growth and development of the high-tech sector.

8.5 Conclusion

This chapter illustrates that the theoretical framework based on ideas from institutional economics in particular formal and informal arrangements helps interpret relationships between high-tech SMEs and financial suppliers. It has found that the efforts of formal and informal arrangements on securing finance in a transitional economy differ from that in a mature market system because of the development level of the institutional environment. Formal arrangements so far have yet to play a central role in making loan decisions, but informal arrangements are more commonly used by staff in the banking sector and informal suppliers to analyse loan suitability and to secure finance in the Chinese financial market. The recognition of financial suppliers towards lending to enterprises is one of the most key factors to find the ways of managing and securing the finance, leading to changing relationships with high-tech SMEs. The availability of each financial source to high-tech SMEs is strongly influenced and led by a set of formal and informal arrangements used by the financial suppliers to assess loan suitability.

The limited support from the banking system to high-tech SMEs results mainly from macro-financial policies relating to the banking sector and the conflicts generated between new formal policies and existing informal conditions. A lack of interest by the banking sector in serving firms led to reasonable contractual arrangements not being accepted by local branches as collaterals, as shown by the evidence that only real estate properties were accepted by local branches as security in practice. It appears that there are institutional deficiencies in contractual arrangements between what are required by the banks and the ability of firms to meet them. Some high-tech firms have therefore been deterred from applying for bank finance since they have perceived they would not

be successful. In contrast, informal investors particularly in coastal provinces actively negotiate such contractual arrangements with some high-tech SMEs where they understand businesses well. They were more confident in investing and managing their investment, and had a closer and more advanced relationship with high-tech SMEs in relation to the three stages of their development. One of the key factors why informal suppliers accept informal conditions to secure the funds is that their ability to judge risk and return of projects is greater than that of bank officials. This is because some informal suppliers perform two tasks including lenders and small business owners at the same time. However, reliance more on informal conditions undoubtedly lead to individual funds being for small amounts and short-term, leading to a gap for medium- and long-term finance in high-tech SMEs.

The role of government in funding high-tech firms varies according to the criteria adopted by the schemes. The funds from the central government were primarily concentrating on a few well-established firms in coastal provinces since the criteria were in favour of firms having technology advantages. The majority of high-tech SMEs especially those in western provinces that have been financially constrained would not be able to benefit from support provided by the national government. The relationship between provincial government and high-tech SMEs varies depending on regional industrial policies. Guangdong government was keen on supporting firms with the approval of promising products and help them to obtain funds from private sources by using their linkages with informal investors. Government agencies in Guangxi were focusing on attracting potential business owners and encouraging the establishment of new high-tech SMEs. It seems that there is a gap in the ability of government agencies to bring private sources together to support promising businesses between the two study provinces.

Chapter 9 Conclusions and implications

9.1 Summarising the main findings

Chapter 5 presented a series research questions which were derived from a central research issue, how do high-tech SMEs in China meet their financial needs in relation to various stages of their development? In this chapter, the main findings are summarised in relation to each of the three subsidiary research questions.

The first research question is: *what specific financial sources actually are sought and used by high-tech SMEs in relation to different stages of their development?* The ease of accessing external sources of finance in high-tech SMEs varies significantly through different stages of their development. This research demonstrates that the major sources for the three development stages of high-tech SMEs are not bank loans and public venture capital, but self-finance, retained earnings, and individual finance; although the banks and venture capital in China are asked by the central government to provide support to high-tech SMEs and SMEs in general. High-tech SMEs in the sample tend to rely predominantly on self-finance and retained earnings not only during start-up and the early stages but also during the later stage. Individual finance remains a major external source for firms at all three stages of development, mainly to satisfy their short term financial needs and demands for working capital.

The short-term identified in this study is a period of time between a few days and a maximum of several months.¹ The primary reason for the short term nature is to reduce the risk of default because of the informal status of individual finance. Another factor is

the concern about the rapidly changing institutional environment for business development. Also, high-tech SMEs are cautious about raising individual funds that are longer than a term of 6 months because of the fear of unaffordable costs of finance and the short life span of products. In particular, some owners of high-tech firms who had sufficient fund are interested in re-investing profits in property rather than the business. In addition, the amount and size of individual funds available varies according to provinces since regional differences in the rate of economic growth and development as well as accumulated personal wealth exist, and are growing. Conclusively, fundraising from informal suppliers is short-term and extensively used to cover working capital and operating expenses in a situation where there is a gap between internal finance and actual needs.

The support offered by the banking sector to firms at start-up and early stages is rather limited, thus bank finance has not been a major source to new and young high-tech businesses in China recently. This research has found that young high-tech SMEs move away from traditional bank loans and become reliant more on private sources. Venture capital is considered as an appropriate source for new high-tech businesses particularly undertaking a radical innovation and commercialisation of new products in a mature market system, as recognised in Chapter 2. However, this research has also found that funds available from the Chinese financial market appear to be very limited for all development stages of high-tech SMEs. The poor access to the banking sector and public venture capital, and short-term of individual finance available clearly suggest that a financial gap exists for medium and long term finance in high-tech SMEs.

Due to the gap for medium and long term finance, it remains difficult for small high-tech businesses to conduct the R&D necessary and make radical and distinctive innovations. In addition, the market demand for low cost products and services results in high-tech SMEs avoiding committing large amounts of medium and long term capital to R&D expenditure. The competitiveness of high-tech SMEs in China is therefore based on either gaining outsourcing of multinational R&D operations or seizing new business opportunities immediately through applying either existing advanced technology or existing technology to products and offering them at an attractive price in the market. In order to achieve competitiveness and overcome financial constraints high-tech SMEs make use of practices such as reducing operating

costs, contracting out production to other companies with surplus plant and equipment, informally cooperating with university or research institutes, and reducing labour costs. However, whilst this strategy appears to have been successful for high-tech SMEs up to now, it is arguably not appropriate for the successful development of these businesses in the long-term.

At the start up stage, the majority of the surveyed firms relied heavily on self-finance including the savings of founders and borrowing from their family and friends. The support from the banking sector and public venture capital were very limited to start up high-tech firms particularly during the period from the late 1990s to the present day. In contrast, funds provided by individual investors were more available to the start-ups. In order to overcome financial constraints, firms tended to shorten the period of time when they stayed in the start-up stage and reduce the amount of initial capital required through developing products and services and contacting initial customers prior to their formation. An effective team of founders with high skills in either technology or management and marketing thus were a key factor to successfully start up a high-tech business. The survey evidence reveals that the majority of high-tech SMEs in the sample were jointly controlled by individuals rather than a family, with average start-up duration of 8 months. However, recruiting additional partners for the purpose of fundraising was often avoided because of the fear of ownership dilution and preferences for retaining complete control of the business.

This study also illustrates that the ease of access to private and public finance in high-tech SMEs at the start-up stage varied significantly between the two industrial sectors. Bio-tech firms made use of a wider range of financial sources and differed significantly from EIT firms in the extent to which they made use of bank loans, funds from individual investors, private equity, government grant/loan, and HP/leasing finance. This reflects that financial suppliers are more interested in providing funds to bio-tech firms than to EIT firms. The incentive for investing in the bio-tech sector is the expected higher level of return on investment. In addition, a greater gap between internal finance and actual demand needs existed within the bio-tech sector than the EIT sector, indicating that bio-tech firms are more likely to seek and use external finance. It also suggests that external sources are available if firms are more pro-active in seeking them.

The early stage firms suffered from a lack of external finance the most, especially for medium and long-term funds. They still relied heavily on self-finance and any retained earnings, but these were not sufficient to funding an increasing scale of production. An early stage firm might not be able to meet their needs for finance from a single individual supplier because of the small amount available. The majority of firms at the early stage therefore sought a wider range of sources of finance than those at either start-up or the later stages and tried to raise funds from all possible sources of finance including formal and informal ones. As claimed by the interviewed owners/senior managers, building-up the customer base depends upon the funds available particularly in the early stage of businesses development. This reflects that potential business opportunities might be overlooked because of a lack of available funds.

In addition, the ease of access to external finance for early stage firms varied significantly not only by the industrial sector but also by geographical provinces. A higher proportion of firms in Guangdong relied on medium and long term funds from their employees rather than on raising short term funds from external individual investors, compared to those in Guangxi. This is because firms in Guangdong were more profitable and able to attract medium and long term funds from their internal staff. In addition, firms in Guangdong made a greater use of a wider range of financial sources than those in Guangxi. There are significant differences in the extent to which funds from the banks, internal staff, and governments were used for early stage firms between the two provinces. An interesting finding is that some Guangdong firms that received bank finance benefited from providing their employees' estate properties to secure the loans.

Although later stage firms drew their funding from a wider range of financial sources and had a greater ability to access formal finance, compared to those in start-up and the early stages, they remained dependent on informal sources of finance such as fundraising from their employees and using the alternative methods. The question raised here is why later stage firms continue to significantly cooperate and integrate with private sources. On the one hand, later stage firms were deterred from applying for bank finance by their expectation of the difficulties involved e.g. complicated application procedure, long period of processing for a loan application, inflexible terms, and strict collateral required. Even those firms that accepted a bank offer might be more

concerned with developing a relationship with local branches rather than meeting their immediate financial needs. On the other hand, the market demand for low cost products and services in the domestic market led to the alternative methods being extensively used even in the later stage to achieve cost reduction. Moreover, pursuing cost reduction led to firms in the later stage being reluctant to invest a large amount of funds in R&D even when it is affordable. Increasing their market shares was perceived by business owners as the most important business strategy for later stage firms to compete with multinational enterprises in the domestic market. This places a barrier to continually improving the quality of products and services and thus threatens the core competitiveness and a long term success of their businesses.

The second research question set up in Chapter 5 is: *to what extent does the current relationship between the demand for and supply of finance for high-tech SMEs indicate deficiencies in the Chinese financial market?* The findings based on the survey evidence demonstrate that there are deficiencies between the banks and high-tech SMEs. The main cause for the deficiencies is the institutional failure and the conflicts between new formal policies and existing informal conditions.

The majority of the firms at start up and the early stages did not gain a bank loan; even at the later stage less than 50% successfully obtained one. Although a high success rate of loan applications has been achieved, a large proportion of the surveyed firms did not apply for a bank loan, especially at the start-up and early stages. The most frequently given reason by interviewed owners for not applying is their inability to meet collateral required by the banking sector. It reflects that owners of high-tech SMEs were deterred from applying for bank loans since they perceived they would be unsuccessful. It also reflects that the bank finance has not become an appropriate source for funding private sector enterprises. Bank managers and credit officers in local branches are paying more attention to reducing the numbers of non-performance loans and promoting new products e.g. mortgage and student loans rather than serving enterprises. In addition, the time it takes to process a loan application means that they are unsuitable for meeting the urgent needs of SMEs. Although the nature of the relationship between the banks and SMEs is in the process of changing, the banks were perceived by SME owners as only dealing with transfer payments between businesses rather than providing loan services.

It is important for the banking sector to improve their own internal systems and reduce the proportion of non-performance loans in the short-run. However, improving the efficiency of the banking sector in serving China's economy as a whole and in particular meeting the financial needs of SMEs is essential in the long-run. The problem is that formal policies and regulations ask staff in local branches to be risk averse for the reduction of non-performance loans, and informal conditions led to staff being even more reluctant to serving small firms. Both result in the failure of institutions. Staff in local branches have been accepting contractual arrangements that are hardly met by high-tech SMEs and SMEs in general. Moreover, the bureaucrat nature of banks' services leads to a complicated procedure and a long period of processing for a loan application.

The information problem between the banks and high-tech SMEs in China may be more severe than in developed countries. It is caused by not only information asymmetry but also by a lack of trust and understanding between the banks and SMEs. The quality of the financial statements provided by small firms might not reach the level that the banks required because of a lack of qualified professionals working with the formal accounting system. Small firms are naturally over cautious about revealing information to outsiders including staff in local branches. Also, the banks are naturally reluctant to accept financial statements provided by small firms. This is because the experience of staff in local branches is limited to serving state owned enterprises with no consideration for the funds' security. They therefore lack skills in assessing loan suitability based on a credit system.

The third research question identified in Chapter 5 is: *what is the current role of government in relation to high-tech firms? To what extent does the range of financial support provided by governments at different levels meet the financial needs of high-tech SMEs, especially for the start-ups as well as R&D and innovation investments?*

The research findings demonstrate that there is clearly a gap for medium and long term finance in high-tech SMEs. The state at national, provincial and city levels has therefore intervened and provided a range of financial support to high-tech SMEs, particularly during the start up stage. The current role that government at different levels is playing has encouraged the formation of new high-tech SMEs and the growth of existing high-

tech firms. However, the support offered by government at the national and provincial levels has had limited effects on driving the R&D and innovation expenditure and developing the core competitiveness. The Scheme provided by the central government namely the Innovation Fund for Small Technology-based Firms has aimed at supporting advanced innovation-based high-tech firms whereas the provincial schemes have been concerned with attracting more high-tech businesses to locate in their regions and thus improving the structure of regional economies. The central government, as a sponsor, has allocated a sufficient amount of funds to a few leading firms primarily located in coastal provinces. In contrast, provincial governments have distributed limited resources e.g. free office space for the first two or three years and a small amount of funds to a significant proportion of firms that meet the criteria and registered in their high-tech parks.

An increasing number of high-tech firms are crucial to the growth and development of the regional economies, particularly in the western provinces and the further transformation of China's economy. However, the greatest challenge facing high-tech SMEs is to make a move away from a heavy dependence on a cost leadership strategy to one of adopting a product differentiation or market focused strategy which involves developing and applying the advanced technology to products. The effects of a range of financial support provided by government on driving the force of funding R&D and innovation are limited: first only a few enterprises obtained sufficient funds from the central government, and most gained a little support from provincial and city government; and second, the ability of the Schemes' winners to access formal sources of finance has not significantly improved subsequently. It is hard to conclude that the range of financial support offered by government at three levels has improved the ability of the majority of high-tech SMEs to conduct R&D and innovation, particularly developing fundamental technology, and removed the difficulties in accessing the banking sector and the public venture capital.

A Scheme, called Three Project Funds of Science and Technology, managed by each provincial government, and devised by the Minister of Science and Technology, was one of the most important schemes dedicated to investment in R&D and innovation in terms of the number of firms assisted. The Scheme's winners would receive a grant of

RMB 100, 000 Yuan in Guangxi and RMB 150,000 Yuan in Guangdong. About one third of the surveyed firms obtained this grant.

The effects of the Funds on the successful firms varied depending on their financial situation. For instance, some firms that had spent a long period in the start-up stage relied on the grant to survive. In contrast some later stage firms that had high profit margins treated it as a bonus rather than using it to fund R&D. The fact that it is more difficult for firms in the start-up stage to be successful in gaining the grant than for mature firms, indicates that the effects of the scheme on funding R&D and raising the level of innovation are incomplete. Furthermore, some firms that were deterred from applying for government funds at provincial level believed that it was not worth applying for one because of the small amount offered. In addition, another scheme especially for business expansion and market development was limited to SMEs in terms of the number of firms awarded.

A similar proportion of firms in the start-up and early stages received government grants/loans across the two provinces. However, a higher proportion of firms in the later stage received a grant in Guangxi than in Guangdong, suggesting that government funds in Guangxi intended for supporting better performance and mature firms rather than firms at the start-up and early stages. It also reflects that later stage firms in Guangxi relied more on the support from local government than those in Guangdong, indicating that the support needs for firms in the later stage vary between the provinces. This illustrates that there is a gap in the level of business development between the two study provinces, as already discussed in provincial differences in informal funds. It implies that the support provided by the central government needs to allow for different levels of high-tech SME's development between the coastal and inland regions.

9.2 Policy implications

According to the survey evidence, the support offered by commercial state owned banks is very limited and places a serious barrier to the further growth and development of high-tech SMEs. In other words, bank loans have not been significant investment sources for high-tech SMEs, particularly at the start-up and the early stages of their development, in China, compared to other countries e.g. the UK as recognised in

Chapter 7. It has to do with the underdeveloped nature of financial intermediaries i.e. the ability of staff in local branches to assess the risk and return of projects, even though the government interference in bank lending has been reduced. In addition, the reform and restructuring of the banking sector in China has been lagging behind the reform of the private industrial sector in particular. Large state owned banks are primarily interested in improving their internal structure and give little attention to the professional and financial services required by private sector SMEs under the current financial institutions made by the central government. State-owned banks' culture e.g. meeting personal interests, ownership structure, and relationship with the banks to make a loan decision is more difficult and takes a longer time to change. However, the private economy has reached a point at which different types of financing are needed to coincide with the different needs in relation to various stages of businesses development. In addition, high-tech SMEs have their distinctive financial needs, especially for R&D and innovation investment. The commercial state-owned banks therefore face challenges to improve their businesses allowing for distinctive characteristics of high-tech SMEs.

The survey evidence also shows that there is a disincentive regarding lending to companies. The local branch of the state-owned commercial banks could easily survive through absorbing individual savings, and then depositing in the People's Bank of China. The interests from depositing in the People's Bank of China could cover the operating expenses of a local branch. They therefore might not be interested in taking the risk of lending to high-tech SMEs and SMEs in general with sharing rewards. Therefore, an important step would be to strengthen profit incentives through improving efficiency of the banking sector in serving China's economy as a whole. The research findings reveal that the costs of bank loans have been considered to be an influencing factor for whether bank offers would be accepted by firms. At present, private owned financial intermediaries are nonexistent officially, which lags behind the reform and development of the other sectors. This implies a lack of incentives to financial intermediaries to serve high-tech SMEs and SMEs in general.

An interesting finding of the survey data is that significant funds from individual investors are available in China, as discussed in Chapter 7. Individual investors are playing an increasingly important role in the financing of high-tech firms in relation to

all stages of their development. The evidence shows that there are individual savers who have considerable amounts of funds available and are seeking investment opportunities. At the same time there are entrepreneurs who are in search of funds. However, because the private investors are not formally recognised their investment takes place within an informal environment. The funds from these private sources are short term and a limited amount within each investment. Individual investors are more likely to invest in working capital with less uncertainty and have less interest in satisfying the financial needs of R&D and innovation and business expansion. It seems that the banking structures have not been sufficiently developed to bring together the aspirations of savers and potential investors with the financial needs of entrepreneurs. This implies again a lack of specific financial intermediaries to fill the gap between potential investors and high-tech SMEs and SMEs in general.

The government faces the challenge of supporting high-tech firms by developing non state/state controlled small and medium size banks aimed at bringing together individual investors with SMEs. Compared with large state-owned banks, small and medium size banks may be in a better position to judge and satisfy the needs of SME customers. For example, they may be more likely to accept a wider range of formal and informal arrangements with which to assess the security of their potential loans. They tend naturally to focus on the underserved market niches, especially the bulk of SMEs. They do not tend to discriminate among customers on the basis of existing relationships, and in their struggle to establish themselves in the market. Also, an environment where a number of banks are competing with each other to providing loans to high-tech SMEs may produce lower loan costs and an improved level of professional service. This will lead to the establishment of long-term and stable cooperation with SMEs and decrease information asymmetry.

The research has also indicated that private equity is playing an increasingly important role in financing high-tech firms in the market in China, particularly in the coastal region, even if it is still in an initial stage of development. More and more individuals and private firms are interested in investing in this market. However, at present, no regulatory guidelines are available to define the legal/organisational structure that can be used to establish a private equity company, leading to a lack of legal protection for individual investors. Thus, only a limited number of 'business angels' are likely to

invest a small amount of venture capital to the firms in situations where they know each other quite well. Governments at different levels have also set up venture capital organisations, and act as investors and offer equity to high-tech SMEs in the financial market. But other non-market influence of operating the government funds has restricted their ability to efficiently serve high-tech SMEs. Moreover, venture capital from the government has been limited by the small amount available because it has not brought sufficient funds from private sources together. It implies a lack of indirect mechanisms to ensure that private equity flows are strong, stable, and accessible to a wide range of companies, particular start-up and early stage high-tech SMEs.

The research has also found that the public equity in China is insufficient to meet the needs of high-tech SMEs in relation to all stages of their development. One of the main reasons given by interviewees is that listing requirements are too restrictive as well as the high cost of applying for, and preparing for listing. Obviously, a new high-tech small business has limited operating histories and might have low profitability in their initial years. However, many high-tech SMEs may still attract investments. The key factor has also to do with the underdeveloped nature of venture capital, although the Second Board has now been established in the Shenzhen Stock Exchange. It therefore could be said that the restrictive listing requirements may constrain private equity investment. In addition, a main reason is that venture capital companies currently focus on serving the large state owned enterprises. The government can improve the capital market by abandoning the restriction on the number of companies that can be listed on the stock market, and by loosening the restrictions on high capital threshold that is particularly prohibitive for SMEs and operating history that is required before a company can be listed on the stock market. A reduction in the high costs of applying for, and preparing for, listing could lead to more high-tech SMEs with promising projects accessing public equity.

The research has indicated that a range of financial support provided by governments at different levels has led to increasing numbers of newly established high-tech businesses. However, the survey evidence reveals that the support is unlikely to drive R&D and innovation expenditure at the firm-level, and therefore not leading to achieving the core competitiveness necessary for the long-term business success. The competitiveness of high-tech SMEs in China was based on applying existing technology/advanced

technology to offer a very attractive price and updating products and services in the domestic market currently. A potential problem is that a business strategy of cost leadership can be imitated easily, leading to a high level of competitiveness in the domestic market. In addition, low cost competitiveness limits the ability of high-tech SMEs to re-invest in R&D and innovation and to be able to continually offer new products to the market. Furthermore, the firms receiving government support might not improve their position in accessing external finance subsequently. This study therefore raises the question of what types of government support to high-tech SMEs are needed to increase their competitive capability in the global economy. The challenges that the government faces are to design a mechanism aimed at raising the level of R&D and innovation and making technological advances.

According to the survey evidence, the difficulties in accessing external funds also relate to the internal characteristics of high-tech SMEs e.g. financial informational opaqueness, the weakness of management and governance, and the small size of enterprises. The implications for enterprises therefore seeking external funds are threefold. Firstly, high-tech SMEs should improve their accounting systems by encouraging their staff to undertake appropriate professional and technical training in modern accounting practices. They should be capable of providing a set of reliable financial statements, which can be used by potential investors to evaluate a project's risk and return. Secondly, enterprises should strengthen their credit awareness and establish a good credit relationship with banks, for instance, by ensuring that bank loan re-payments are conducted promptly. Thirdly, to solve the problem of high-tech SMEs of lacking sufficient collateral to secure bank loans, a new guarantee system could be established which unites private and government funds. For instance, high-tech firms could be linked via membership of a local commercial association which would pool resources, expertise and knowledge. Via such a local commercial association, a government loan guarantee could be operated to provide collateral for high-tech SMEs. Owners of the firms therefore are motivated to secure loans because they should not destroy their reputation in the community. Furthermore, a commercial association through local knowledge and members would have access to more information with which to evaluate the risk of the investment than government agents have.

The survey evidence shows that there is a gap in the availability of informal finance to high-tech SMEs between the coastal and the western region. Firms located in the coastal region are in a better position to obtain funds from internal staff and external individuals than those in the western region, contributing to the different level of business development between them. A more significant size of individual funds was used by high-tech SMEs in Guangdong than in Guangxi, suggesting that sufficient informal finance is available in the Eastern coastal region. Thus, the challenges that the government faces are to fill the gap by establishing a mechanism aiming at ensuring private investment funds flows to high-tech firms from the Eastern coastal to the Western region.

In general, in order for high-tech SMEs to overcome a gap for medium and long-term finance, the challenges that the government face are to meeting the needs of a more accessible and sophisticated the banking system and the financial market. The design and implementation of improved institutional environments designed to give enterprises greater access to external funds, are the priority in the further transformation of the Chinese financial system.

9.3 Future research directions

This thesis has addressed the gap in the literature of the financing high-tech SMEs in China in relation to the three stages of their development. Future research directions result from three aspects including: 1) the limitation of this research, 2) the need to test the research findings through further investigation of this issue in a wider range of geographical provinces and industrial sectors, and 3) the suggestions arising from both the research findings and published studies.

The limitation of this research based on two geographical provinces suggests that there is a need for similar business surveys to be conducted in a wider range of geographical areas. As noted in Chapter 5, this study has been limited to just two provinces from both wealthy and poorer parts of China because of the limited resources available. The generalisation of these research findings to Chinese high-tech SMEs as a whole is therefore restricted. Additional empirical studies focusing on financing high-tech SMEs

are needed to test the research findings in a wider range of geographical provinces and contexts.

This thesis has examined the financing of high-tech SMEs during a period of time when the institutional environment has been changing rapidly in China and has demonstrated how the availability of financial sources to high-tech SMEs depends on the changing institutional environment. For instance, initial capital that was mainly from supervisory agencies in the middle 1980s has changed to be mainly from founder teams and private sources of finance in recent years. Support from the banking system has weakened during the current period compared to the 1980s and the early 1990s because of the changes in macro-financial policies and regulations relating to the reforms of the banking system. Currently, the majority of high-tech SMEs are unlikely to conduct the level of R&D needed to make radical and distinctive innovations because of a lack of sufficient funds. Presumably, the ability of high-tech SMEs that will establish in next a few years to access finance and to develop technological advances will be improved. Therefore, there is a need for taking a longitudinal study by which new high-tech SMEs being established in next a few years will be investigated, and expected changes will be examined.

The research findings suggest that a comparative study is needed to examine regional differences in the availability of informal sources to high-tech SMEs between the Eastern coastal and the Western regions. As discussed in Chapter 7, informal finance was a major source for high-tech SMEs at all three stages of their development both in Guangdong and Guangxi. Adopting flexible contractual arrangements to secure informal investments led to a greater availability of informal finance than bank loans and public venture capital to high-tech SMEs being made in both study provinces, as analysed in Chapter 8. However, informal suppliers in Guangdong provided larger amounts of funds to high-tech SMEs and set lower levels of interest, compared to those in Guangxi. The differences are undoubtedly related to the fact that private sector enterprises have developed faster over the past 30 years in Guangdong than in Guangxi, as recognised in Chapter 3. But it is difficult to determine how much the differences in the availability of informal funds should be attributed to such economic factors and how much to the ability of informal suppliers to manage and secure investments. What institutional arrangements that are employed by informal suppliers in the Eastern coastal

region make a greater availability of informal funds to high-tech SMEs compared to the Western region? Further empirical research into whether the individual investors in the Eastern coastal region are more experienced and capable of managing their investment than those in the Western region should be conducted.

The research findings also suggest the need for further research that focuses on the informal venture capital market in China. The new survey evidence indicates that support from the public venture capital has yet to become a major source to Chinese high-tech SMEs because of its underdeveloped nature. In contrast informal venture capital (i.e. business angels and private firms) is playing an increasingly important role in funding high-tech SMEs. However, very few academic studies and government reports have been concerned with business angels and private companies that provide funds to high-tech firms in China. Therefore, it is necessary to conduct additional empirical studies focusing on informal venture capital and its role in supporting high-tech SMEs.

Additional research as to whether high-tech SMEs at the later stage continue to use resources from universities and state-owned research institutes to conduct R&D and innovation is also suggested by this research. The survey evidence indicates that, during the start-up stage of business development, support from public organisations i.e. a university or a state-owned research institute was important for high-tech SMEs to develop initial products and services. Using either free or at low costs resources from universities and research institutes to develop initial products and services has been one of the key factors in establishing high-tech businesses in China. However, a question raised here is whether high-tech SMEs that have reached the later stage of development continue to use resources from public organisations to improve products and services because of possible problems relating to intellectual rights. Therefore, further research that addresses the links between mature high-tech SMEs and universities/research institutes should be conducted.

Appendix 1— The Questionnaire in English Version

This questionnaire is designed for the face to face interviews with owners/senior manager of high-tech SMEs in China.

I can assure you that this interview will be confidential and used solely for the purposes of my PhD research.
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1. General information of the interview

Date of interview	
Interviewee's Name	
Interviewee's job title	
Name of company	
Telephone number	
Fax number	
Email address	
Post address	
Sample province and city	
Sample area (in/off a high tech park)	
Industrial sector	
Main business activities	

2. The Profile of Owner/ Manager

2.1 Please give your name and job title (must be either the owner or a senior member of the firm such as the MD)

Name:

Job title:

2.2 What is the highest qualification, academic/ professional, held by the three main business owners

	Owner 1	Owner 2	Owner 3
1=None			
2=Up to high school			
3=Diploma			
4=First degree			
5=Master			
6=Doctor			
7=Other (Specify)			

2.3 Please indicate the current age group of the three main business owners

	Owner 1	Owner 2	Owner 3
1=Under 30			
2=30-45			
3= Over 45			

2.4 The gender of the three main owners of the business

1=Male

2=Female

3=Co-owned (i.e. male and female partners)

2.5 What job did the main business owners have before he/she is running the firm?

1=Academic staff in universities

2=Academic staff in state owned research institutes

3=Civil servant in government

4=Senior member in large state own enterprises

5=Banker

6=Owner of private businesses

7=Academic back from overseas

8=Other (please specify)

3. Background Information about the Firm

3.1 Why is the firm located the current address?

3.2 In what year was the business established?

3.3 Did the business have a supervisory agency at the start-up stage of development? If so, what was it?

3.4 What was the total employment (including both full-time and part-time as well as the owners/managers) in your firm 12 months ago?

3.5 What is the total number of employment in your firm now (including both full-time and part-time as well as the owners/managers)?

3.6 What is the total number of employees with education degree (at least diploma) in your firm now?

3.7 Briefly describe the firm's main products/services

3.8 What is the ownership of the firm?

1=Private

2=Collective

3=State-owned

4=Foreign invested (also including firms invested by Hong Kong, Macau, and Taiwan)

5=Other (please specify)

3.9 Has the ownership of the firm changed previously? If so, why?

3.10 Approximately what percentage of total sales turnover currently originates from within the domestic market?

3.11 Approximately what percentage of total sales turnover currently originates from international markets?

3.12 Approximately what percentage of total sales turnover has been invested in R&D and innovation over the last 12 months?

3.13 How did the total value of sales turnover in 2003/2004 compare with 2002/2003?

1=More than 20% higher

2=Between 10%--20% higher

3=About the same

4=More than 10% lower

3.14 Did the firm make a profit/ loss or breakeven in 2003/2004

1=Profit

2=Breakeven

3=Loss

3.15 Which bank does the firm currently bank with (if more than 1, choose the two main banks)?

1=None

2=China Bank

3=Industry and Commercial Bank

4=Construction Bank

5=Agriculture Bank

6=City co-operate Bank

7=Private bank

8=Foreign bank

9=Other

3.16 How satisfied are you with your current bank? Why?

1=Very satisfied

2=Satisfied

3=Neutral

4=Dissatisfied

5=Very dissatisfied

4. Sources and Types of Finance Sought and Used in Relation to the Three Stages of Business Development

I would now like to ask some questions about your experience of raising finance and the sources actually used at the start-up, the early and the later stages of your business development

4.1 What external sources of finance did you try to access when the business was started?

4.2 Which of the following sources of finance did you approach?

Source	Approach	Supplied finance
Self-financing	Yes/no	Successful/unsuccessful/not followed up
Bank loans	Yes/no	Successful/unsuccessful/not followed up
Investment from supervisory agencies	Yes/no	Successful/unsuccessful/not followed up
Gov Grant and loan	Yes/no	Successful/unsuccessful/not followed up
Venture capital (domestic or foreign)	Yes/no	Successful/unsuccessful/not followed up
Individual funds	Yes/no	Successful/unsuccessful/not followed up
Leasing or hire purchase	Yes/no	Successful/unsuccessful/not followed up
Other (please specify)	Yes/no	Successful/unsuccessful/not followed up

4.3 If other, please specify the source/sources

4.4 Which of the sources approached, if any, actually supplied you with finance?

(Record in table above)

4.5 (a) Are you aware of the existence of (1) the Innovation Fund for Small Technology-based Firms and (2) Torch Programs, (3) any others?

IF NO, GO TO Q4.5(G)⇒

(b) How did you know about the schemes above?

(c) Did you apply for a grant or loan under the schemes above?

1=Grant

2=Soft loan (interest free)

(d) If yes, how long did it take to receive a decision on your application?

(e) How were the applications processed under the programs?

(f) Are there any ways in which you think the application process could be improved?

(g) If no, why don't you apply for it?

4.6 If venture capital was obtained at the start-up, was this

1=Domestic venture capital

2=Foreign venture capital

4.7 If the initial capital was from individual investors, what was the process of fundraising in this informal financial market?

4.8 (a) If bank finance was obtained at the start-up, was this:

1=A medium and long-term loan

2=A short-term loan

3=Other (please specify)

(b) Were you or your supervisory agency asked to give security/collateral?

(c) What type of collateral has been given for the bank loan?

(d) Was your request for finance rejected by one bank before being accepted by another?
If so, why?

4.9 If a bank loan has not been obtained, please explain why?

4.10 What percentage of total start-up finance actually came from the following sources?

	Bank loan	Venture capital	Family and friends	Supervisory agency
Percentage of total start-up finance				

4.11 How long has your business stayed at the start-up stage of development?

4.12 During the early stage of development, which of the following sources did you approach?

Source	Approach	Supplied finance
Self-financing	Yes/no	Successful/unsuccessful/not followed up
Retained earnings	Yes/no	Successful/unsuccessful/not followed up
Supervisory agencies	Yes/no	Successful/unsuccessful/not followed up
Bank loan	Yes/no	Successful/unsuccessful/not followed up
Gov grant and loan	Yes/no	Successful/unsuccessful/not followed up
Venture capital(domestic)	Yes/no	Successful/unsuccessful/not followed up
Venture capital (foreign)	Yes/no	Successful/unsuccessful/not followed up
Individual investors	Yes/no	Successful/unsuccessful/not followed up
Other	Yes/no	Successful/unsuccessful/not followed up

4.13 What did you exactly do to support your applications to access external funds?

4.14 If other, please specify the sources

4.15 Which of the sources approached, if any, actually supplied you with finance?
(Record in table above)

4.16 If bank finance has been used during the early stage of development, what type of collateral/security were you asked to give?

4.17 If bank finance has not been used at the early stage of development, why?

4.18 Are you an eligible for a loan or grant under the Innovation Fund for Small Tech-based Firms, Torch Program, or any others? If yes, have you applied for it during the early stage of development?

4.19 For what reasons did you apply for a government loan or grant?

4.20 Please indicate the main uses (up to 2) to which external finance obtained during the early stage has been put?

1=Working capital (e.g. current assets such as cash and stock)

2=To acquire fixed assets (e.g. equipment, vehicles, land and premises)

3=Project finance (e.g. marketing campaign, diversification)

4=Other (please explain)

4.21 How long has your business stayed in the early stage of development?

4.22 Which of the following sources did you approach during the later stage of development?

Source	Intent to Approach	Supplied finance
Self-finance	Yes/no	Yes/no/not applicable
Retained earnings	Yes/no	Yes/no/not applicable
Bank loans	Yes/no	Yes/no/not applicable
Listed in stock markets	Yes/no	Yes/no/not applicable
Other	Yes/no	Yes/no/not applicable

4.23 If other, please specify the sources

4.24 Which of the sources approached, if any, actually supplied you with finance?
(Record in the table above)

4.25 For what main purposes?

1=Working capital (e.g. current assets such as cash and stock)

2=To acquire fixed assets (e.g. equipment, vehicles, land and premises)

3=Project finance (e.g. marketing campaign, diversification, innovation)

4=Other (explain)

5. Government Support

5.1 Please indicate what following government support that you have obtained during the three stages of business development?

	National level			Provincial level			City level		
	1	2	3	1	2	3	1	2	3
1= Gov loan or grant									
2= Tax relief									
3= Any type of administration fees discount/relief									
4= Priority to application process									
5= Priority to external finance									
6= Export Permission									
7= Advice/guidance									
8=Other (please specify)									

1=the start-up stage, 2=the early stage, 3=the later stage

5.2 For what reasons did you want government support?

1=Help with fundraising

2=Help with export

3=Help with innovation

4=Help with access local communities

5=Other (please specify)

5.3 Please indicate the following ways by which you found out about government support during the start-up stage?

1=Advertising on newspaper/ TV / internet

2=Friends /colleagues

3=Government agencies

4=Universities/ state owned research institutes

5=Supervisory agency

6=Other

5.4 If you have obtained advice or guidance from any government agencies when the business was started, what main types of assistance were obtained from any of the following?

1=General start-up advice

2=Free/discount office and plant space

3=Help in raising finance

4=Advice with financial planning

5=Help in writing a business plan

6=Other (please specify)

5.5 If you have been offered tax relief, how did you claim the tax paid back? How difficult did you claim the tax?

1=Very difficult

2=Neutral i.e. neither difficult nor easy

3=Easy

5.6 If you obtained a government grant/loan, did the support increase your credibility of receiving external finance later on? If so, please indicate for what purposes the capital was used from any of the following?

1=Working capital

2=To acquire Fixed assets

3=R&D and innovation

4=Project capital

5=Other (please specify)

5.7 Please identify the following reasons for selecting the firm's current location (Guangdong and Guangxi)?

1=Hometown

2=Social network

3=Convenient transportation

4=Labour costs

5=More developed regional economy

6=Other (please specify)

5.8 Are you located in a high-tech park? If so, please identify the reasons for locating in a high-tech park from any of the following.

1=Free or discount office and plant space

2=Priority to access financial sources

3=Priority to obtain tax relief

4=Easier to obtain export permission

5=Better services

6=Other (please specify)

5.9 Do you keep on contacting with government agencies? If so, please indicate the main reasons for doing so from any of the following?

1=Information

2=Priority to access government sources

3=Advices or suggestions

4=Priority to obtain export permission

5=Other

5.10 Could you please explain whether the government support that you received impacted upon the ability of your company to access external finance? If so, how did it work?

5.11 How satisfied were you with the assistance received?

1= Satisfied

2= Neutral i.e. neither satisfied or dissatisfied

3= Dissatisfied

5.12 To what extent did you think the incentives provided by governments at national, provincial, and city levels are important for the growth and development of your business? Please explain why?

1=Very important

2=Important

3=Neither important nor unimportant

4=Not important

5.13 Do you expect to have any support from government agencies during the next 12 months? If yes, can you indicate what type of support you will require?

Appendix 2— The Questionnaire in Chinese Version

关于中国高新技术中小企业融资的调查问卷

本次采访的内容将是保密的，并且采访获得的信息仅仅用于我在英国 MIDDLESEX 大学的博士课题研究

1.本次采访的简要情况

采访时间	V2
被采访人姓名	V3
被采访人工作职位	V4
被采访公司名称	V1
电话号码	V5
电子邮件	V6
通信地址	V7
所在省市	V8
是否位于高新开发区	V9
产业部门	V10
主要经营活动	V11

2.业主或经理档案

2.1 请给出您的姓名及工作职位（须为公司的业主或高级经理）

姓名

职务

2.2 主要业主的最高学历

	业主 1 V12	业主 2 V13	业主 3 V14
1=无			
2=高中			
3=大专			
4=大学本科			
5=硕士			
6=博士			
7=其他（请说明）			

2.3 请指出主要业主的年龄段

	业主 1 V15	业主 2 V16	业主 3 V17
1=30 岁			
2=30—45 岁			
3=45 岁以上			

2.4 主要业主的性别

V18

1=男性

2=女性

3=即有男性又有女性

2.5 主要业主在经营这个公司之前的工作经历

V19 V20 V21

1=大学的讲师或教授

2=研究机构的研究人员

3=政府的公务人员

4=大型国有企业的高级职员

5=银行家

6=个体私营企业的业主

7=海外归国学者

8=其他（请说明）

3.公司的基本情况

3.1 为什么公司位于现址？

1=环境服务好 V22

2=交通方便 V23

3=家乡 V24

4=已有的关系 V25

5=便宜的人力工厂 V26

3.2 公司于哪一年建立？ V27

3.3 公司在成立初期是否附属于某个单位？如果有，请说出它的名字？

V28 V29

3.4 从现在算起，12个月之前公司有多少员工（包括全职，兼职员工及业主）？

V30

3.5 公司现有多少员工（包括全职，兼职员工及业主？ V31

3.6 公司现有多少员工拥有至少大学本科及以上学历？ V32

3.7 请简要介绍公司的主要产品及服务？ V33

3.8 请从以下列举的所有制结构指出公司的所有制结构？ V34

1=私营企业

2=集体企业

3=国有企业

4=外资企业

5=其他（请说明）

3.9 公司的所有制结构之前有变化吗？如果有，请说明？ V35

3.10 公司现有总销售的多大比例来自于国内市场？ V36

3.11 公司现有总销售的多大比例来自于国际市场? V37

3.12 过去 12 个月公司销售的多大比例被投资于研究与开发? V38

3.13 2003 年公司总销售额与 2002 年相比怎样?

1=高于 20%

2=高于 10—20%之间

3=大约相同

4=低于 10% V39

3.14 公司在 2003 年是赢利, 亏损或持平?

1=盈利

2=持平

3=亏损 V40

3.15 公司目前与哪家银行合作(假如多于一家; 选择主要的两家)?

1=无

2=中国银行

3=中国工商银行

4=中国建设银行

5=中国农业银行

6=国家控股的银行

7=私有银行

8=外资银行

9=其他(请说明) V41 V42

3.16 您满意银行的服务吗? 为什么?

1=非常满意

2=满意

- 3=一般
- 4=不满意
- 5=非常不满意

V43

4.公司在发展的各个阶段寻求和实际使用的融资资源

这一部分的目的是想了解您的公司在发展的创办，投入经营和增长发展三个阶段的融资经历和实际使用的融资资源

4.1 公司在创办阶段，您曾经试图申请那些外部的融资资源？

4.2 下列哪些资源您曾经寻求过？

资源	是否申请	是否成功
自身融资	是/ 否 V44	成功/ 失败/ 没有继续 V53
银行贷款	是/ 否 V45	成功/ 失败/ 没有继续 V54
大型国有企业	是/ 否 V46	成功/ 失败/ 没有继续 V55
政府的资助或贷款	是/ 否 V47	成功/ 失败/ 没有继续 V56
个体投资者	是/ 否 V48	成功/ 失败/ 没有继续 V57
私营企业	是/ 否 V49	成功/ 失败/ 没有继续 V58
风险投资(国内或国外)	是/ 否 V50	成功/ 失败/ 没有继续 V59
租用或分期付款	是/ 否 V51	成功/ 失败/ 没有继续 V60
其他（请说明）	是/ 否 V52	成功/ 失败/ 没有继续 V61

4.3 假如是其他，请说明何种资源？ V62

4.4 加入申请到政府的资金，它是 V63

- 1=资助
- 2=贷款

4.5 假如没有申请到政府的资金，为什么？

- 1=不需要
- 2=太麻烦
- 3=成本太高
- 4=申请需要太长时间

5=数量太小 V64

4.6 假如没有申请到银行贷款，为什么？

1=不需要

2=太麻烦

3=成本太高

4=申请需要太长时间

5=数量太小 V65

4.7 假如在创办阶段，公司成功地融集到风险基金，它是 V66

1=国内风险基金

2=国外风险基金

4.8 假如创办阶段的资本来自于个体投资者，这个市场融资的过程怎样？

V67

V68

V69

V70

4.9 在公司发展的初创阶段，下列各种融资资源占总资本的比例？

资源	银行贷款 V71	风险资本 V74A	家庭或朋友 V72	政府的贷款或资助 V73	其它 V74
占总资本的比例					

4.10 (A) 假如在创办阶段，公司成功的申请到银行的贷款，它是

1=中长期贷款

2=短期贷款

3=其它（请说明） V71A

B) 您提供了什么作为贷款抵押？

1=公司的物业房产

2=私有的物业房产

3=合同

4=除物业以外的固定资产

5=银行开具的信用证

6 项目计划书 V71B

4.11 您的公司历经了多长的初创阶段? V75

4.12 在公司发展的投入经营阶段(最长至 3 年), 下列哪些资源你有申请?

资源	是否申请	是否成功
自身融资	是/ 否	成功/ 失败/ 没有继续 V79
保留利润	是/ 否	成功/ 失败/ 没有继续 V80
银行贷款	是/ 否 V76	成功/ 失败/ 没有继续 V88
大型国有企业	是/ 否	成功/ 失败/ 没有继续 V81
吸收新的合伙人	是/ 否	成功/ 失败/ 没有继续 V82
私营企业	是/ 否	成功/ 失败/ 没有继续 V83
政府的资助或贷款	是/ 否 V77	成功/ 失败/ 没有继续 V77A
风险投资(国内或国外)	是/ 否 V78	成功/ 失败/ 没有继续 V78A
外包	是/ 否	成功/ 失败/ 没有继续 V85
市场营销代理	是/ 否	成功/ 失败/ 没有继续 V86
内部集资	是/ 否	成功/ 失败/ 没有继续 V84
租用或分期付款	是/ 否	成功/ 失败/ 没有继续 V87

4.13 假如是其他, 请说明何种资源?

4.14 假如在投入经营阶段您使用了银行贷款, 您被要求提供了何种贷款抵押?

1=公司的物业房产

2=私有的物业房产

3=合同

4=除物业以外的固定资产

5=银行开具的信用证

4.15 如果在公司发展的投入经营阶段您没有使用银行贷款，请解释为什么？

1=不需要

2=没有申请

3=没有抵押物

4=数量太小

5=其它

V90

4.16 在公司发展的投入经营阶段，请指出被掌握的外部资金用于何处？

1=流动资金（例如：现金或存货）

V91

2=购买固定资产（例如：设备，汽车，土地和经营场所）

V92

3=项目融资（例如：市场营销，多样化）

V93

4=其他（请解释）

V94

4.17 您的公司经历了多长时间的投入经营阶段？

V99

4.18 在公司的增长发展阶段，您寻求或申请及运用了下列哪些融资资源？

资源	是否申请	是否成功
自身融资	是/ 否	成功/ 失败/ 没有继续 V104
保留利润	是/ 否	成功/ 失败/ 没有继续 V105
银行贷款	是/ 否 V100	成功/ 失败/ 没有继续 V106
政府的资助或贷款	是/ 否 V101	成功/ 失败/ 没有继续
风险投资(国内或国外)	是/ 否 V102	成功/ 失败/ 没有继续
在股票市场上市	是/ 否 V103	成功/ 失败/ 没有继续
大型国有企业	是/ 否	成功/ 失败/ 没有继续 V108
私营企业	是/ 否	成功/ 失败/ 没有继续 V109
吸收新的合伙人	是/ 否	成功/ 失败/ 没有继续 V110
外包	是/ 否	成功/ 失败/ 没有继续 V111
其他（请说明）	是/ 否	成功/ 失败/ 没有继续 V112

4.19 假如是其他，请解释？ V113, V113A, V113B

4.20 假如在增长发展阶段您使用了银行贷款，您被要求提供了何种贷款抵押？

1=公司的物业房产

2=私有的物业房产

3=合同

4=除物业以外的固定资产

5=银行开具的信用证

6 项目计划书

V107

4.21 如果在公司增长发展阶段您没有使用银行贷款，请解释为什么？

1=不需要

2=没有申请

3=没有抵押物

4=数量太小

5=其它

4.22 请指出已获得的资本被用于下列何种主要目的？

1=流动资金（例如：现金或存货）

V114

2=购买固定资产（例如：设备，汽车，土地和经营场所）

V115

3=项目融资（例如：市场营销，多样化）

V116

4=其他（请解释）

V117

4.23 假如没有使用银行贷款和市场融资，请解释？

5. 政府的支持

5.1 在公司发展的创办阶段，您掌握了下列哪些政府支持？

	国家级	省级	市级
1=政府的贷款或无偿援助	V95	V96	V97
2=税收减免或返还			
3=管理费减免			
4=免费土地的使用			
5=申报过程的优先			
6=外部融资的优先			
7=出口权许可			
8=建议或指导			
9=其他（请解释）			

5.2 在公司发展的创办阶段，请指出您是通过下列哪些途径得知政府提供支持的？

- 1=各种媒体上的广告
- 2=朋友或同事
- 3=政府主管部门
- 4=大学或研究机构
- 5=其他（请解释）

5.3 假如您得到税收返还，您是怎样申请的？整个程序有多困难？ V118

- 1=非常困难
- 2=一般（即不困难也不容易）
- 3=容易

5.4 假如您申请到政府的贷款或无偿援助，它是否有助于您成功的进一步申请外部的投资？并请指出投资被用于下列哪种目的？

- 1=流动资金

- 2=固定资产
- 3=研究与开发
- 4=项目融资
- 5=其他（请说明）

5.5 假如您的公司位于高新开发区, 请从以下所列举的原因中指出您为何选择落户这里?

- 1=土地或房屋的无偿使用或减免
- 2=优先申请融资资源
- 3=优先获得税收减免
- 4=更容易掌握研究机构的支持
- 5=优先获得出口许可权
- 6=其它（请说明）

5.6 您对已收到的政府支持的满意度如何?

- 1=满意
- 2=一般
- 3=不满意

5.7 请解释您获得的政府支持是如何影响和改善公司融集外部资源的能力的?

5.8 接下来的 12 个月, 假如您需要政府的支持, 请说明您需要哪类的支持?

5.9 您认为政府的高新技术产业政策对您公司发展影响的程度如何? 并请解释为什么?

- 1=非常重要
- 2=重要
- 3=一般
- 4=不重要

Appendix 3—The list of questions

This list of questions is designed for the face to face interview with bank managers/credit officers

Date of interview:

Name of local branch:

Name of interviewee:

Job title of interviewee:

Note: it is not necessarily to ask all questions presented in the following with one respondent, which would depend on his/her position to have information.

1. How long have you been working as a bank manager/credit officer in a local branch?
2. Are there any changes in loan decision making to enterprises in particular high-tech SMEs over the last two decades? If so, what are the changes? And what main reasons cause the changes?
3. What criteria have you been adopting to assess the risk and return of projects and make a loan decision in recent years? What criteria have you employed to assess the loan applications before the late 1990s?
4. From your points of view, is it possible for high-tech SMEs to successfully obtain bank finance in recent years based on the criteria adopted? If no, why are not the banks interested in providing funds to SMEs in general and high-tech SMEs in particular?
5. Can you describe the application process? Are there any ways by which the application process can be improved?
6. What services are the local branches providing to firms since the late 1990s?

7. How do the local branches make profits to cover their operating expenses in recent years?

Appendix 4—the list of questions

This list of questions is designed for the face to face interview with government officials

Date of interview:

Name of government department:

Name of interviewee:

Job title of interviewee:

Note: it is not necessarily to ask all questions presented in the following with one respondent, which would depend on the position of the interviewee.

1. How long have you been working in this position? What are your responsibilities of providing support to high-tech SMEs
2. How many high-tech firms in your city/provinces? Can you describe the distribution of high-tech firms in terms of industrial sectors in the park? What industrial structure are you trying to achieve?
3. From your points of view, what are the main barriers to grow and develop the high-tech sector? What support do the governments at different levels provide to high-tech firms? To what extent the support have significant effects on the growth and development of high-tech SMEs?
4. Please indicate what financial support that governments at different levels provide to high-tech firms? Are there any specific funds particularly for supporting firms during the start-up stage and R&D? If so, whether or not the schemes have achieved their targeted aims?

5. From your points of view, is there any financial constraints that high-tech firms have? If yes, please explain whether or not government can help firms to overcome financial constraints? and why?

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